Series 1951, No. 2

Issued July 1958

SOIL SURVEY

Bradley County Tennessee

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
TENNESSEE AGRICULTURAL EXPERIMENT STATION
TENNESSEE VALLEY AUTHORITY

How to Use THE SOIL SURVEY REPORT

THIS SURVEY of Bradley County will help you plan the kind of farming that will protect your soils and provide good yields. It describes the soils; shows their location on a map; and tells what they will do under different kinds of management.

Find Your Farm on the Map

In using this survey, start with the soil map, which consists of the 30 sheets bound in the back of this report. These sheets, if laid together, make a large photographic map of the county as it looks from an airplane. You can see woods, fields, roads, rivers, and many other landmarks on this map.

To find your farm on the large map, use the index to map sheets. This is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located.

When you have found the map sheet for your farm, you will notice that boundaries of the soils have been outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map.

Suppose you have found on your farm an area marked with the symbol Ha. You learn the name of the soil this symbol represents by looking at the map legend. The symbol Ha identifies Hamblen silt loam.

Learn About the Soils on Your Farm

Hamblen silt loam and all the other soils mapped are described in the section, Soil Types and Phases. Soil scientists walked over the fields and through the woodlands. They described and mapped the soils. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noted differences in growth of crops, weeds, brush, or trees; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming.

After they mapped the soils, the scientists talked with farmers and studied experimental data; then they placed each soil in a management group. A management group is a group of similar soils that need and respond to about the same kind of management.

Hamblen silt loam is in management group 1. Turn to the section, How to Use and Manage the Soils, and read what is said about soils of group 1. You will want to study the table, which tells you how much you can expect to harvest from Hamblen silt loam under two levels of management. In columns A are yields to be expected under ordinary management, and in columns B are yields to be expected under improved management.

Make a Farm Plan

For the soils on your farm, compare your yields and farm practices with those given in this report. Look at your fields for signs of runoff and erosion. Then decide whether or not you need to change your methods. The choice, of course, must be yours. This survey will aid you in planning new methods, but it is not a plan of management for your farm or any other farm in the county.

If you find that you need help in farm planning, consult the local representative of the Soil Conservation Service or the county agricultural agent. Members of your State experiment staff and others familiar with farming in your county will also be glad to help you.

Fieldwork for this survey was completed in 1950. Unless otherwise specified all statements in this report refer to conditions in the county at that time.

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SOIL SURVEY OF BRADLEY COUNTY, TENNESSEE

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United States Department of Agriculture in cooperation with Tennessee Agricultural Experiment Station and Tennessee Valley Authority

General Character of the Area

BRADLEY COUNTY occupies part of a limestone lowland belt that extends across eastern Tennessee. It consists of an area of parallel low ridges or chains of knobs. The surface relief of the intervening valleys is relatively smooth. One low mountain occurs along the northwestern boundary.

The soils range from very shallow to very deep. Generally, their characteristics are closely related to the parent rock, which consists mainly of limestone, sandstone, and shale, or of mixtures of these rocks.

Agriculture is the chief industry. The climate and soils are suited to many different crops. Corn, hay, oats, wheat, and soybeans are among the principal crops. The acreage of cotton is declining. Tobacco is grown as a cash crop. A few farms sell forest products.

Livestock consists mainly of cattle, horses, mules, hogs, and chickens. Much of the livestock is raised for home use. Dairying is expanding. Many general farms produce crops, or livestock, or both. Some farms specialize in poultry or in livestock other than poultry. Many farms produce mainly for home use.

Location and Extent

Bradley County is in the southeastern part of Tennessee (fig. 1), in the Great Valley of East Tennessee. The total area is 338 square miles, or 216,320 acres.

Cleveland, the county seat, is about 80 miles southwest of Knoxville and 25 miles east and a little north of Chattanooga. The Hiwassee River forms a large part of the northern boundary and separates the county from McMinn County. On the east the county is bounded by Polk County, on the northwest by Meigs County, on the west by Hamilton County, and on the south by the State of Georgia.

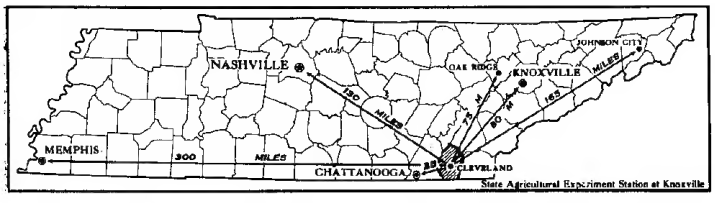

Figure 1.—Location of Bradley County in Tennessee.

Physiography

Practically all of Bradley County lies in the Appalachian Valley or Ridge and Valley physiographic province. A small part along the western side of the county is on White Oak Mountain, which is part of the Cumberland Plateau section (*6*).[2] The part of the Appalachian Valley in Tennessee is known as the Great Valley of East Tennessee. It crosses the eastern part of the State in a northeast-southwest direction.

Low ridges, stream valleys, and lines of knobs, parallel among themselves and extending in a northeast-southwest direction, make up the topography of Bradley County. The ridges are underlain by narrow strips of rock that are slightly harder than those underlying the intervening valleys. The surface has been changed by the streams flowing upon it. The valleys are underlain by easily soluble limestone or soft shale, whereas the ridges are composed of limestone that contains a high percentage of insoluble materials or of tough shale and sandstone (*12*).

Relief

The relief of the county is predominantly rolling and hilly, although it ranges from nearly level to steep.

The highest point in the county, on White Oak Mountain, is at an altitude of 1,495 feet[3]. On Candies Creek Ridge near Charleston, the altitude is 1,080 feet. Cleveland, which is almost in the center of the county, has an altitude of about 900 feet. At McDonald in the southwestern part of the county, the altitude is 869 feet, and along the Hiwassee River it is about 700 feet.

Along most of the streams throughout the county the altitude ranges from 700 to 760 feet, and on the ridges, from 800 to 1,100 feet. In most places the difference in altitude between the valleys and the adjacent hills and ridges ranges between 100 and 300 feet.

Drainage

Most of the county is drained by tributaries of the Hiwassee River, which flow in a northeasterly direction. In addition, about one-third of the county is drained by streams that flow in a southerly direction

[1] Fieldwork for this survey was done when Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952. R. C. Jurney, Soil Conservation Service, assisted in writing the report.

[2] Italicized numbers in parentheses refer to Literature Cited, p. 94.

[3] Data on altitude from U. S. Geological Survey and Tennessee Valley Authority topographic sheets.

to the Conasauga River, which enters and leaves the county at its southeastern corner.

The tributaries of the Hiwassee and Conasauga Rivers interlock at their headwaters. The divide between the two drainage systems is not distinct.

Except for some areas within the Coahulla watershed in the southern part of the county, surface drainage of the upland is well developed in all places. In the Coahulla watershed area, surface drainage is fairly slow because of nearly level relief. With this exception, slow surface drainage is confined almost entirely to the bottom lands.

During periods of high water, many streams are subject to overflow. The Mouse Creek bottom lands are particularly subject to flooding. Many of the small streams are intermittent. Generally, they cease to flow during the driest part of the year. In the shale areas the drainage pattern is dendritic, but in the narrow shale valleys and in the limestone areas it is less uniformly so.

Rock Formations

All of the county is underlain by sedimentary rocks —shales, limestones, and sandstones. The rocks differ greatly in resistance to weathering. Partly because of these differences, and also because of the intense folding and faulting of the rocks, Bradley County is characterized by numerous parallel ridges and valleys. The ridges are formed by the most resistant rocks, and the valleys, the least resistant (*8*).

Shales are the predominant rocks. Limestones are second in extent. A small part of the county is underlain by sandstones.

The shales vary greatly throughout the county. Some are calcareous, and some are acid. Some have interbedded layers of limestone. In places acid and calcareous shale are interbedded. Generally, the soils from acid shales are grayish or yellowish. They are inherently low in fertility.

In greater part, the limestones are dolomitic. Generally, they contain different amounts of chert. Because the cherty dolomitic limestones are somewhat resistant to weathering, they are generally on the ridges and have produced cherty soils. Some of the limestone is clayey, and soils very plastic and high in clay content have formed from them. In places the limestone is sandy or may contain both sandstone and chert. Generally, the limestones or other calcareous rocks have given rise to the more productive soils. In these soils reddish subsoils predominate.

The sandstones, which are also resistant to weathering, form the higher ridges. Calcareous sandstone forms the ridges known locally as the Red Hills. Some of the more rugged areas in the county have formed from purple, brown, or white sandstone in sandy shale. The soils in these areas generally are shallow and low in fertility.

White Oak Mountain consists of brown sandstone and shale, capped with interbedded chert and limestone.

Climate

The climate of Bradley County is humid and continental. Winter and summer temperatures are moderate. Frequent rainy periods and short cold spells characterize the short winters.

During January and February, 1 or 2 days of sunshine may be followed by a cloudy day and then by 3 or 4 days of rain. The cycle is common during winter. Compared to some other parts of the country, the summer nights are cool but the summer days are warm.

Table 1, compiled from reports of the United States Weather Bureau station at the Chattanooga airport, gives normal monthly, seasonal, and annual temperature and precipitation typical of that prevailing in Bradley County.

The average annual temperature is 60.0° F. The absolute maximum is 104°, and the absolute minimum is –10°. The average annual precipitation is 53.60

TABLE 1.—*Normal temperature and precipitation at Chattanooga Airport, Hamilton County, Tenn.*

[Elevation, 670 feet]

Month	Temperature[1]			Precipitation[2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1904)	Wettest year (1929)	Average snowfall
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
December	42.1	75	3	5.31	4.12	2.89	1.5
January	41.6	76	–7	5.23	2.58	5.72	2.5
February	44.0	79	–10	5.11	2.08	5.83	2.2
Winter	42.6	79	–10	15.65	8.78	14.44	6.2
March	50.7	89	2	6.05	5.81	10.80	.8
April	59.7	92	25	4.53	1.67	6.70	.2
May	67.7	95	37	4.16	2.76	12.00	0
Spring	59.4	95	2	14.74	10.24	29.50	1.0
June	75.8	100	39	4.21	1.92	4.39	0
July	78.3	104	56	5.34	2.09	3.21	0
August	77.3	101	54	3.70	5.03	.45	0
Summer	77.1	104	39	13.25	9.04	8.05	0
September	72.5	104	38	2.69	1.07	5.66	0
October	60.8	92	26	3.24	.46	3.12	(3)
November	49.1	81	11	4.03	3.09	11.60	.3
Fall	60.8	104	11	9.96	4.62	20.38	.3
Year	60.0	104	–10	53.60	32.68	72.37	7.5

[1] Average temperature based on a 18-year record, through 1955; highest and lowest temperatures based on a 52-year record, through 1930.

[2] Average precipitation based on a 77-year record, through 1955; wettest and driest years based on a 77-year record, in the period 1879-1955; snowfall based on a 52-year record, through 1930.

[3] Trace.

inches. The total for the driest year is 32.68 inches, and for the wettest year, 72.37 inches.

The monthly precipitation ranges from 6.05 inches in March to 2.69 inches in September. The wettest period extends from the first of December to the last of March. The driest months are August, September, and October.

Local flash floods may be expected throughout the growing season. Hailstorms and strong winds often injure crops. During winter occasional light snowfalls occur, but the snow melts in a day or two. The soil is seldom frozen more than 2 or 3 inches deep, and rarely remains frozen more than 3 or 4 days at a time.

The average frost-free season of 207 days extends from April 2 to October 26. In 2 out of 3 years frost kills a large part of the peach buds. In half the years, frost severely damages the apple and berry buds. The grazing period extends from about April 1 to the latter part of November.

Generally, the climate is especially favorable for early maturing crops. It is also good for crops that need a long growing season and can withstand dryness during the last stages of their growth and period of maturing. Fall-sown small grains are well-suited as early maturing crops. The winters are sufficiently mild to allow good stands of these crops to be maintained, and the spring temperature and moisture conditions are exceptionally favorable for their development to early maturity.

Cotton, corn, lespedeza, and tobacco are long-season crops that can persist through dry periods that come during the final stages of their development and period of maturity. Potatoes, especially late potatoes, are a crop not so well suited to the climate of Bradley County. Generally, strawberries can obtain sufficient moisture to produce a large yield; however, in some years dry weather occurs too early in the growing season to allow good development of the crop. Turnip greens, mustard, onions, and other hardy vegetables grow throughout the winter.

Water Supply

The county is fairly well supplied with water. Only in a few places has lack of water been a serious limitation in choice or development of enterprises.

On some of the permanent pastures, perennial streams provide water for cattle. Intermittent streams furnish a great deal of water, except during September and October, the driest months. In the cherty ridges, sinkholes and dug ponds are the main sources of water for livestock.

Water for farm and domestic use is supplied by springs, cisterns, and drilled wells. In the limestone areas there are many springs. They are less numerous in the shale and sandstone areas. Cisterns are more common on the ridges than elsewhere. Most of the springs and drilled wells are in the valleys.

Settlement, Organization, and Population

Bradley County was created about 1835. It was the central portion of the Ocoee District, which covered that part of the State south of the Hiwassee and Tennessee Rivers (*7*).

In 1835 the first permanent white settlement had begun to form at the present location of Cleveland (*13*). The early settlers were principally of Scotch, Irish, and English descent. Most of them came from North Carolina and Virginia.

In 1950 the rural-farm population was 19,733 and the urban population was 12,605. Cleveland, the largest town, was incorporated in 1838. The 1950 population of Cleveland was 12,605, and that of Charleston, the second largest town, was about 750. Smaller towns are Tasso and McDonald.

Transportation and Markets

Cleveland and Charleston are the principal markets and shipping points for agricultural products. Chattanooga, a large city in an adjoining county, is an important market and shipping point, principally for the southwestern part of Bradley County.

The Southern Railway Company furnishes direct freight connections to important centers in the eastern United States. Cleveland, Charleston, and McDonald have direct railroad connection with Chattanooga and Knoxville and are on the main line of the Southern Railway Company between Washington and New Orleans.

Two United States highways and two State highways traverse the more populated parts of the county. They furnish transportation routes to Chattanooga and Knoxville and to Dalton, Georgia.

Public roads serve all parts of the county. According to the 1950 census, 242 farms were located on hard-surfaced roads; 886 farms on gravel, shell, or shale roads; and 390 farms on dirt or unimproved roads.

In practically all parts of the county farm-to-market travel facilities are adequate. In 1950, the distance to the trading center visited most frequently was less than 1 mile for 40 farms; 1 to 4 miles for 462 farms; 5 to 9 miles for 651 farms; and 10 miles or more for 380 farms. In the same year, the distance over dirt or unimproved road was 0 to 0.2 mile for 357 farms; 0.3 to 0.9 mile for 125 farms; 1.0 to 4.9 miles for 451 farms; and 5.0 miles and over for 360.

Community, Farm, and Home Facilities

Schools and churches are conveniently located, and rural mail delivery routes serve all parts of the county.

According to the 1954 census, which reports the estimated number of farms in Bradley County as 1,394, electricity was available on 1,344 farms; 759 farms had telephones; 208 had milking machines; 124 had electric power feed grinders; and 288 had home

freezers. In 1954, 733 tractors were reported on 614 farms.

Industries

Agriculture is the chief industry of Bradley County. Many people work in related services and industries. In some sections many rural families depend partly on industry for their livelihood. Among the industrial plants in Cleveland are woolen and hosiery mills and woodworking and lumber plants.

Agriculture

According to the 1954 census, the average size of farms in Bradley County is 101.1 acres. The crops are well diversified. Owners operate most of the farms, but tenants and sharecroppers operate some of them.

Most farmers follow a general type of farming. Practically all the farms have some livestock. Cotton is the principal cash crop. Burley tobacco is also a cash crop, but it is grown to a lesser extent. Dairying is an important enterprise, and the raising of beef cattle approaches dairying in importance. Food and feed crops, chiefly corn, wheat, oats, and alfalfa, are produced and used mostly on the farm. Some corn and hay is sold locally, but practically all surpluses are fed to livestock raised for market.

Land Use

Bradley County has a total area of 216,320 acres. According to the 1954 census, 66.8 percent, or 144,579 acres, was in farms. In 1954 the land in farms was distributed as follows:

	Farms reporting	*Acres*
Cropland, total	1,283	51,622
Harvested	1,146	32,419
Used only for pasture	441	10,558
Not harvested and not pastured	611	8,645
Woodland, total	1,209	63,522
Pastured	663	19,829
Not pastured	891	43,693
Land pastured, total	1,236	54,324
Other pasture (not cropland and not woodland)	992	23,937
Other land (house lots, roads, wasteland, and so on)	1,337	5,498

There are no national forests in the county. The Chickamauga Reservation along the Hiwassee River is the only large publicly owned area. Much acreage has been flooded by the reservoir of Chickamauga Dam, one of the dams built by the Tennessee Valley Authority.

Areas of the county used for crops include the greater part of the land suited for crops, but it also includes land not suited for crops. Most permanent pasture is on soils suitable for that use, but some soils well suited to crops are used for permanent pasture.

In 1954 the farms were distributed by size and acreage as follows:

	Number	*Acreage*
Size of farms (acres):		
Less than 10	156	690
10 to 29	208	3,792
30 to 49	200	7,750
50 to 69	172	10,034
70 to 99	191	15,673
100 to 139	156	18,092
140 to 179	139	21,591
180 to 219	71	14,175
220 to 259	38	8,957
260 to 499	79	27,651
500 to 999	16	9,804
1,000 and over	4	6,370

The number of farms by type of farm, as compiled from the 1954 census, is as follows:

	Number
Type of farm:	
Field-crop farms other than vegetable and fruit-and-nut	175
Cash-grain	10
Cotton	90
Other field-crop	75
Dairy farms	232
Poultry farms	105
Livestock farms other than dairy and poultry	71
General farms	81
Primarily crop	51
Primarily livestock	15
Crop and livestock	15
Miscellaneous and unclassified farms	730

Agricultural Practices

The agricultural practices vary according to the size of farms, differences in soil types, patterns of soil distribution, and lay of the land.

Modern machinery is generally used on the larger farms of the smooth and rolling areas and on a cooperative basis on many smaller farms. Combines are used in harvesting most small grains. Nearly all corn is harvested by hand. In the hilly or steep areas, much of the tillage is done by light implements.

Many different crops are grown in the county. Prevalent farm practices are as follows: Small grains are planted in the fall and harvested in June and during the first part of July. Most of the corn is planted in May, cut and shocked in fall, and husked during winter. Generally, grasses and legumes are sown both in fall and early in spring. Lespedeza is sown in March and April. Alfalfa, however, is sown in August.

Most farmers do not follow a systematic crop rotation. The particular needs of the farmer or the general fertility level of the field usually determine the crop to be grown. On some farms tobacco and cotton are planted in the same field year after year. A cover crop is frequently turned under for those crops. Corn and hay crops are rotated on many soils of the bottom lands and hilly uplands. The use of winter crops is increasing. On the undulating and rolling areas, systematic crop rotation is common. A 3-year rotation consisting of corn, a small grain, and lespedeza is used. On the more productive soils a popular 5-year rotation consists of corn, a small grain, and alfalfa for 3 years.

According to local dealers, the sale of fertilizers is steadily increasing and the rates of application are far greater than in the past years. The fertilizers most commonly used at the time this survey was made (1951) were 3–9–6,[4] 4–12–4, and superphosphate.

Corn and wheat generally are fertilized with 200 to 300 pounds of superphosphate, 3–9–6, 4–12–4, or a similar fertilizer. Cotton is commonly fertilized with 3–9–6 or 4–12–4 at the rate of about 400 pounds an acre. Tobacco is generally fertilized with 4–12–4, and the rate of application is generally 600 to 1,000 pounds an acre. Barnyard manure is used chiefly for tobacco and vegetable crops. Phosphorus fertilizer and lime are commonly applied to legume crops and to some extent to pasture mixtures.

Crops

Corn, hay, oats, wheat, and soybeans are the most important crops on the basis of acreage. Corn is grown on many farms, but according to the 1954 census its acreage has declined 51 percent since 1930. The acreage of wheat has declined about 53 percent since 1930, whereas the acreage of oats has increased 80 percent. Acreages of rye and barley are relatively small. Most of the wheat is marketed, but the oats and barley are mostly fed to livestock. The small grains provide winter cover and winter pasture. Lespedeza, alfalfa, and clover are grown on most farms for hay or pasture.

The acreage of cotton has declined nearly 86 percent since 1930. Cotton is grown chiefly on soils that are too droughty for satisfactory yields of corn. Burley tobacco is grown on a large number of farms, but its total acreage is small. Fruits, berries, potatoes, sweetpotatoes, and many different vegetables are grown in small acreages on almost all farms for home use. Strawberries are grown for both home use and for local markets.

The acreage of the principal crops and number of fruit trees and grapevines of bearing age are given in table 2 for the stated years.

TABLE 2.—*Acreage of the principal crops and number of fruit trees and grapevines of bearing age in stated years*

Crop	1929	1939	1949	1954
	Acres	*Acres*	*Acres*	*Acres*
Corn harvested for grain	16,872	16,877	11,037	8,303
Small grains, threshed or combined:				
Oats	152	559	3,587	3,047
Wheat	2,392	1,461	1,170	1,113
Barley	218	197	378	541
Rye	72	219	34	58
Soybeans for all purposes	1,800	21	884	1,576
Cowpeas for all purposes	652	1,380	179	71
All hay, total	17,202	22,664	15,219	19,662
Lespedeza cut for hay	(1)	8,727	4,990	7,952
Alfalfa	259	1,602	2,253	1,488
Clover and timothy, alone or mixed	1,389	722	968	1,625
Small grains cut for hay	399	634	1,359	3,041
Legumes cut for hay	2,482	3,047	765	1,546
Other cultivated and wild grasses	12,673	7,932	4,884	4,010
Corn cut for silage and fodder, or hogged or grazed off	510	592	840	734
Potatoes, Irish	254	236	82	32
Sweetpotatoes	319	318	151	53
All other vegetables harvested for sale	205	124	111	69
Tobacco	120	158	268	256
Cotton	5,842	3,795	2,570	835
Strawberries	290	56	[2] 71	[2] 29
	Number[3]	*Number*[3]	*Number*[3]	*Number*
Apple trees	28,023	13,638	7,848	1,956
Peach trees	157,107	54,881	5,361	2,261
Pear trees	1,823	893	528	227
Plum trees	1,454	889	418	235
Cherry trees	789	1,292	307	85
Pecan trees	63	73	159	40
Grapevines	3,735	4,727	1,933	870

[1] Not available.
[2] Harvested for sale.
[3] Number in census year, which is 1 year later than the crop year given at the head of the column.

Pastures

Generally all the farms have some fields classed as plowable pasture. The quality of this type of pasture is low. Many of the pastures occur on soils that are poor for crops and of low value for pasture. Most of the permanent pastures are on hilly and steep soils or on soils that are no longer used for crops because of erosion. Some permanent pastures are on poorly drained soils.

Lespedeza, white and hop clovers, redtop, bermudagrass, orchardgrass, ryegrass, and bluegrass are the common pasture plants. Most of the pastures consist of lespedeza, mixed with one or more of the clovers or grasses. Broomsedge and native wild grasses dominate in many pastures. On thin shaly soils many pastures consist almost entirely of broomsedge. Alfalfa is used mostly in rotation pasture. On the better soils in limestone valleys, the pastures contain much bluegrass and whiteclover.

Generally, the management level for pastures has not been high. Many farmers are now improving their pastures by fertilization and by controlling weeds and grazing.

Livestock and Livestock Products

Livestock in Bradley County consists mainly of cattle, horses, mules, hogs, and chickens. According to

[4] Percentages, respectively, of nitrogen, phosphate, and potash.

the 1954 census, 5,789 cattle, calves, or both, were sold alive from the 777 farms reporting; 2,132 hogs and pigs from 204 farms; and 4 sheep and lambs from 1 farm.

In 1954 a total of 1,368,799 chickens was sold from 294 farms, and 211,068 dozens of chicken eggs were sold from 489 farms.

Dairy products were sold from 367 farms in 1954. On the day preceding the 1954 census enumeration, cows milked numbered 5,217 on 1,105 farms and produced 9,447 gallons of milk.

The number of livestock of all ages on farms of the county are given in table 3. The figures are based on census reports for the stated years.

TABLE 3.—*Livestock of all ages on farms in stated years*

Livestock	1930	1940	1950	1954
	Number	*Number*	*Number*	*Number*
Cattle	10,544	[1] 9,505	12,858	16,867
Horses	1,081	[1] 1,321	1,308	612
Mules	2,272	[1] 1,852	1,308	726
Hogs	3,396	[2] 3,408	4,195	3,402
Sheep	608	[3] 311	51	18
Chickens	[1] 56,543	[2] 54,530	[2] 68,333	[2] 66,967

[1] Over 3 months old. [2] Over 4 months old. [3] Over 6 months old.

Much of the livestock is raised for home use. The number of livestock on a general type of farm is small. Most farmers keep one or two dairy cows for home needs and enough hogs for home supply of pork. Most of the farms keep a small flock of chickens for home needs and also as a source of income.

Dairying, as an enterprise, is expanding. Most of the dairy herds are in the valleys where the soils are more productive. Beef cattle are raised mostly on soils that are hilly or low in fertility. The principal breeds are Jersey, Guernsey, Hereford, and Aberdeen Angus.

Since 1930 the number of hogs raised and kept on farms has remained about the same. The chief breeds are Duroc-Jersey, Poland China, and Chester White.

Sheep are not an important source of income, and their number is small.

The breeds of chickens most common are Plymouth Rock, White Leghorn, New Hampshire, and Barred Plymouth Rock. A few ducks, geese, turkeys, and guineas are also raised.

Forest Products

Forest products are produced to some extent. According to the 1954 census, 4,301 cords of firewood and fuelwood were cut on the 481 farms reporting; 34,973 posts were cut on 241 farms; and 2,133 thousand board feet of sawlogs and veneer logs were cut on 95 farms. More information on timber resources will be found in the section, Forests of Bradley County.

Farm Equipment and Work Power

The use of modern farm machinery is increasing. The number of work animals on farms has decreased considerably since 1930. The decrease will probably continue because tractors are becoming more plentiful. The 1954 census reports a total of 1,338 work animals in the county, of which 612 were horses and 726 were mules. Most of the horses and mules are shipped into the county.

According to the 1954 census, there were 733 tractors on 614 farms reporting; 580 motortrucks on 534 farms; and 883 automobiles on 763 farms. There were also 59 grain combines on 58 farms; 22 corn pickers on 22 farms; and 109 pick-up hay balers on 109 farms.

The 1954 census classifies the farms by work power as follows: No tractor, horses, or mules on 430 farms reporting; no tractor and only 1 horse or mule on 170 farms; no tractor and 2 or more horses, mules, or both, on 190 farms; tractor and horses, mules, or both, on 389 farms; and tractor and no horses or mules on 215 farms.

Farm Tenure and Labor

According to the 1954 census, full owners operated 1,052 farms, or 74.0 percent of the farms in the county; part owners 193, or 13.5 percent; and tenants 180, or 12.5 percent. Only 5 farms were operated by managers. Tenancy is steadily decreasing. In 1954 there were 25 cash tenants, 5 share-cash tenants, 55 share tenants, 35 croppers, and 60 other tenants. The farm laborers are mainly native whites.

In 1954 full owners operated 98,027 acres of the 144,579 acres of land in farms; part owners operated 28,583 acres, and managers 1,284 acres. Tenants operated 16,685 acres, and of these, cash tenants operated 875 acres; share-cash tenants, 738 acres; share tenants, 6,293 acres; and croppers, 4,930 acres. Full owners harvested 19,152 acres of cropland in 1954; part owners, 9,099 acres; managers, 335 acres; and all tenants, 3,833 acres.

In 1954 the number of farm operators residing on farm operated was 1,375; not residing on farm operated, 31; with other family income, exceeding value of agricultural products sold, 676; and working off their farm, 831.

Farm Expenditures

The 1954 census reports that, of the 1,430 farms in the county, 1,389 had farm expenditures as follows:

	Farms reporting
Machine hire, hired labor, or both	822
Machine hire	681
Hired labor	492
Feed for livestock and poultry	1,203
Gasoline and other petroleum fuel and oil	789

Soil Survey Methods and Definitions

The scientist who makes a soil survey examines soils in the field, classifies them in accordance with facts that he observes, and maps their boundaries on an aerial photograph or other map.

FIELD STUDY.—The soil surveyor bores or digs many holes to see what the soils are like. The holes are spaced irregularly according to the lay of the land. Usually they are not more than a quarter of a mile apart, and sometimes they are much closer. In most soils each boring or hole reveals several distinct layers, called horizons, which collectively are known as the soil profile. The profile is studied to see how the horizons differ from one another and to learn the things about the soil that influence its capacity to support plants.

Color is usually related to the amount of organic matter. The darker the surface soil, as a rule, the more organic matter it contains. Streaks and spots of gray, yellow, and brown in the lower layers generally indicate poor drainage and poor aeration.

Texture, or the content of sand, silt, and clay, is determined by the way the soil feels when rubbed between the fingers. Texture is later checked by laboratory analysis. Texture determines how well the soil retains moisture, plant nutrients, and fertilizer, and whether it is easy or difficult to cultivate.

Structure, which is the way the individual soil particles are arranged in aggregates and the amount of pore space between aggregates, gives us clues to the ease or difficulty with which the soil is penetrated by plant roots and by moisture. The aggregates may have prismatic, columnar, blocky, platy, or granular structure.

Consistence, or the tendency of the soil to crumble or to stick together, indicates whether it is easy or difficult to keep the soil open and porous under cultivation.

Other characteristics observed in the course of the field study and considered in classifying the soil include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that will interfere with cultivation; the steepness and pattern of slopes; the degree of erosion; the nature of the parent material from which the soil has developed; and the acidity or alkalinity of the soil as measured by chemical tests.

CLASSIFICATION.—On the basis of the characteristics observed by the survey team or determined by laboratory tests, soils are classified by series, types, and phases.

As an example of classification, consider how the Sequoia series in Bradley County is separated into types and phases:

Series	*Type*	*Phases*
Sequoia	Silt loam	Undulating phase.
		Rolling phase.
	Silty clay loam	Eroded undulating phase.
		Eroded rolling phase.
	Silty clay	Severely eroded rolling phase.

Soil series.—Soils similar in kind, thickness, and arrangement of layers are normally designated as a soil series. In a given area, however, a soil series may be represented by only one soil.

Soil type.—Soils having the same texture in the surface layer and similar in kind, thickness, and arrangement of layers are classified as one soil type. A soil type may be divided into one or more soil phases.

Soil phase.—Soil types are divided into soil phases because of differences other than those of kind, thickness, and arrangement of layers. Slope variations, frequency of rock outcrops, degree of erosion, depth of soil over the substratum, or natural drainage are examples of characteristics that suggest dividing a soil type into phases.

The soil phase, or the soil type, if it is not to be subdivided, is the mapping unit on the soil map. It is the unit that has the narrowest range of characteristics. Use and management practices therefore can be specified more easily than for soil series or yet broader groups that contain more variation.

Miscellaneous land types.—Fresh stream deposits and rough, stony, or severely gullied land are not classified by types and series. They are identified by a descriptive name. Gullied land, shale soil materials, is a miscellaneous land type in Bradley County.

Soil complex.—When small areas of two or more soils are so intricately associated that it is not feasible to show them separately on the soil map, they are mapped together and called a soil complex. Lehew-Montevallo loams, hilly phases, is a complex mapped in Bradley County.

Definitions of many terms used in soil surveys are given in the glossary, p. 93.

The Soils of Bradley County

The soils of Bradley County differ in many characteristics, including color, texture, consistence, reaction, relief, stoniness, depth to underlying material, permeability, and drainage. These differences affect the suitability for agriculture. Table 4 lists the important characteristics for the soil series of the county.

The soil relationships are more easily understood if the soils are grouped according to position on the landscape. Accordingly, the main soil series are discussed by physiographic groups as follows: Soils of uplands; soils of colluvial slopes; soils of terraces; and soils of bottom lands. Some of the groups are further divided to show the different kinds of parent materials from which the soils in one physiographic position were formed.

Soils of Uplands

The soils of the uplands lie above the adjacent stream bottoms. They have developed from material formed in place from the parent rock. Soils of the uplands are the dominant soils of the county. Generally their properties are related to and influenced by the parent rock. In Bradley County there are three classes of such rocks: (1) Limestone, (2) shale, and

TABLE 4.—*Major characteristics of the*

Series	Parent material	Position	Dominant relief	Natural drainage
Alcoa	Old colluvium and local alluvium from uplands underlain chiefly by calcareous sandstone.	Colluvial slopes	Rolling	Well drained
Apison	Material weathered in place from acid shale, or interbedded acid shale and sandstone.	Uplands	Undulating to rolling	Well drained to somewhat excessively drained.
Barbourville	Local alluvium and colluvium from uplands underlain chiefly by acid sandstone and sandy shale.	Colluvial slopes	Rolling	Well drained to moderately well drained.
Bolton	Material weathered in place from sandy dolomitic limestone.	Uplands	Rolling to hilly	Well drained to excessively drained.
Bruno	Recent general alluvium derived from uplands underlain mainly by sandstone, quartzite, sandy shale, sandy dolomitic limestone, and calcareous sandstone.	Bottom lands	Level to gently undulating	Excessively drained
Capshaw	Old general alluvium derived from uplands underlain mainly by limestone.	Terraces	Undulating	Moderately well drained
Clarksville	Material weathered in place from cherty dolomitic limestone.	Uplands	Rolling to hilly	Well drained to excessively drained.
Colbert	Material weathered in place from clayey limestone.	Uplands	Undulating to rolling	Somewhat poorly drained to moderately well drained.
Conasauga	Material weathered in place from acid shale, or interbedded acid shale and sandstone.	Uplands	Undulating	Somewhat poorly drained
Cotaco	Local alluvium and colluvium from uplands underlain chiefly by shale, sandstone, or both, and limestone in places.	Colluvial slopes	Nearly level to gently sloping.	Somewhat poorly drained to moderately well drained.
Cumberland	Old general alluvium derived from uplands underlain mainly by limestone; in some places also contains materials originating from sandstone, shale, and quartzite.	Terraces	Undulating to rolling	Well drained to somewhat excessively drained.
Dandridge	Material weathered in place from calcareous shale.	Uplands	Hilly to steep	Somewhat excessively drained to excessively drained.
Decatur	Material weathered in place from high-grade limestone.	Uplands	Undulating to rolling	Well drained
Dewey	Material weathered in place from high-grade limestone.	Uplands	Rolling	Well drained to somewhat excessively drained.
Dowellton	Material weathered in place from clayey limestone.	Uplands	Level to undulating	Somewhat poorly drained to moderately well drained.
Emory	Local alluvium and colluvium from uplands underlain chiefly by high-grade limestone.	Colluvial slopes	Level to undulating	Well drained
Etowah	Old general alluvium derived from uplands underlain mainly by limestone.	Terraces	Undulating to rolling	Well drained
Farragut	Material weathered in place from interbedded limestone and shale.	Uplands	Undulating to rolling	Well drained to somewhat excessively drained.
Fullerton	Material weathered in place from dolomitic limestone, cherty dolomitic limestone, or dolomitic limestone containing thin sandy layers.	Uplands	Rolling to hilly	Well drained to excessively drained.

Footnotes at end of table.

soil series in Bradley County, Tenn.

Surface soil color	Subsoil		Soil depth [1]	Topographic position
	Color	Texture		
Dark reddish brown	Yellowish red	Clay loam or silty clay loam in the upper part; clay loam in the lower part.	Shallow to very deep.	Foot slopes associated with steep calcareous sandstone ridges.
Light brownish gray or yellowish brown to brownish yellow.	Brownish yellow in the upper part; mottled brownish yellow and reddish yellow in the lower part.	Silt loam or silty clay loam	Very shallow to deep.	Shale valleys.
Grayish brown to brown	Brown to yellowish brown[2]	Fine sandy clay loam or stony fine sandy clay loam.[2]	Moderately deep to very deep.	Heads of drainageways and base of slopes in shale valleys.
Reddish brown to brown	Dark reddish brown in the upper part; dark red to red in the lower part.	Silty clay loam in the upper part; silty clay or silty clay loam in the lower part.	Very deep	Cherty ridges.
Light brown to yellowish brown.	Brownish yellow to yellowish brown.[2]	Loamy fine sand or loam[2]	Very deep	First bottoms.
Brown to dark yellowish brown in the upper part; yellowish brown in the lower part.	Brownish yellow	Silty clay loam	Deep to very deep.	Low to high stream terraces.
Light gray to pale yellow in the upper part; pale yellow in the lower part.	Brownish yellow to pale yellow.	Cherty silty clay loam or silty clay.	Very deep	Cherty ridges.
Pale yellow to brownish yellow or yellowish brown.	Brownish yellow to yellowish brown.	Silty clay or clay	Shallow to deep	Limestone valleys.
Light brownish gray or very pale brown to yellowish brown.	Light yellowish brown to pale brown or brownish yellow in the upper part; mottled light gray, brownish yellow, and yellowish red in the lower part.	Silt loam in the upper part; silty clay loam in the lower part.	Shallow to deep	Shale valleys.
Grayish brown to light brownish gray.	Mottled gray and brownish yellow or light brownish yellow.[2]	Silty clay loam to loam or sandy clay loam.[2]	Shallow to very deep.	Foot slopes in shale valleys.
Dark brown to reddish brown, or red to dark red.	Red or dark red in the upper part; reddish brown to red in the lower part.	Silty clay loam in the upper part; clay loam in the lower part.	Deep to very deep.	High stream terraces.
Light yellowish brown to brown or pale yellow.	Brownish yellow[2]	Shaly or very shaly silt loam or silty clay loam.[2]	Very shallow to deep.	Shale hills and ridges.
Reddish brown to dark reddish brown.	Red to dark red in the upper part; red in the lower part.	Silty clay	Deep to very deep.	Low ridges in limestone valleys.
Dark brown or reddish brown.	Yellowish red to red	Silty clay loam grading with depth to silty clay.	Very deep	Rounded crests of low ridges in limestone valleys.
Pale brown	Mottled light gray and brownish yellow.	Silty clay	Shallow to moderately deep.	Shale valleys.
Dark brown to dark reddish brown.	Dark reddish brown or reddish brown.[2]	Silt loam or silty clay loam[2]	Deep to very deep.	Foot slopes and fans in limestone valleys.
Dark brown to reddish brown.	Reddish brown in upper part; yellowish red to red in the lower part.	Silt loam to silty clay loam in the upper part; silty clay loam in the lower part.	Deep to very deep.	High stream terraces.
Dark brown to dark reddish brown, or reddish brown to red.	Reddish brown or yellowish red to red in the upper part; yellowish red to red in the lower part.	Silty clay loam or silty clay in the upper part; silty clay in the lower part.	Shallow to very deep.	Low ridges in shale valleys.
Grayish brown or brown through reddish yellow to red.	Red or yellowish red in the upper part; yellowish red or red in the lower part.	Silty clay loam or sandy clay loam in the upper part; silty clay or sandy clay in the lower part.	Very deep	Cherty ridges.

TABLE 4.—*Major characteristics of the*

Series	Parent material	Position	Dominant relief	Natural drainage
Greendale	Local alluvium and colluvium from uplands underlain chiefly by dolomitic limestone and cherty dolomitic limestone.	Colluvial slopes	Gently sloping	Well drained to moderately well drained.
Hamblen	Recent general alluvium derived from uplands underlain mainly by sandstone and shale; limestone in places.	Bottom lands	Nearly level	Somewhat poorly drained.
Hermitage	Old colluvium and local alluvium from uplands underlain chiefly by high-grade limestone.	Colluvial slopes	Undulating to rolling	Well drained
Holston	Old general alluvium derived from uplands underlain mainly by sandstone, shale, and limestone.	Terraces	Undulating to rolling	Well drained to somewhat excessively drained.
Huntington	Recent general alluvium derived from uplands underlain mainly by limestone.	Bottom lands	Level to gently undulating	Well drained
Jefferson	Old colluvium and local alluvium from uplands underlain chiefly by shale and sandstone.	Colluvial slopes	Rolling	Well drained to somewhat excessively drained.
Leadvale	Old colluvium and local alluvium from uplands underlain chiefly by shale and sandstone; limestone in places.	Colluvial slopes	Undulating	Somewhat poorly drained to moderately well drained.
Lehew[3]	Material weathered in place from acid sandstone and shale.	Uplands	Steep	Excessively drained
Lindside	Recent general alluvium derived from uplands underlain mainly by limestone.	Bottom lands	Level to gently undulating	Somewhat poorly drained
Litz	Material weathered in place from acid shale containing a few limestone layers.	Uplands	Rolling to hilly	Excessively drained
Melvin	Recent general alluvium derived from uplands underlain mainly by limestone.	Bottom lands	Level to gently undulating	Poorly drained
Minvale	Old colluvium and local alluvium from uplands underlain chiefly by cherty limestone.	Colluvial slopes	Rolling	Well drained
Montevallo[4]	Material weathered in place from acid shale, or interbedded acid sandstone and shale.	Uplands	Rolling to hilly	Excessively drained
Monongahela	Old general alluvium derived from uplands underlain mainly by sandstone and shale; limestone in places.	Terraces	Undulating	Moderately well drained
Mullins	Material weathered in place from acid shale, or interbedded acid shale and sandstone.	Uplands	Nearly level	Poorly drained
Muse	Old colluvium and local alluvium from uplands underlain chiefly by shale.	Colluvial slopes	Undulating to rolling	Well drained to somewhat excessively drained.
Muskingum[5]	Material weathered in place from acid sandstone.	Uplands	Steep	Excessively drained
Neubert	Local alluvium and colluvium from uplands underlain chiefly by calcareous sandstone or shaly sandstone.	Colluvial slopes	Level to undulating	Moderately well drained

Footnotes at end of table.

soil series in Bradley County, Tenn.—Continued

Surface soil color	Subsoil		Soil depth[1]	Typographic position
	Color	Texture		
Grayish brown to brown	Yellowish brown[2]	Silt loam or silty clay loam, or cherty silt loam or silty clay loam.[2]	Very deep	Foot slopes, alluvial fans, and positions along and at the head of intermittent drainageways in cherty ridges.
Pale brown to brown	Yellowish brown mottled with brown and gray; below this is gray mottled with brownish yellow and brown.[2]	Silt loam to silty clay loam in the upper part; silty clay loam in lower part.[2]	Deep to very deep	First bottoms.
Dark reddish brown or reddish brown.	Dark reddish brown grading with depth to reddish brown; below this yellowish red.	Silt loam in the upper part; silty clay loam to silty clay in the lower part.	Deep to very deep	Foot slopes in limestone valleys.
Pale brown or light yellowish brown.	Brownish yellow grading with depth to yellowish brown.	Clay loam	Deep to very deep	Moderately high to high stream terraces.
Reddish brown grading with depth to dark brown.	Dark brown to brown [2]	Silt loam to silty clay loam, or loam to clay loam.[2]	Very deep	First bottoms.
Brownish yellow or grayish brown to dark yellowish brown.	Yellowish brown to strong brown in the upper part; mottled yellow, yellowish red, and gray in the lower part.	Clay loam	Moderately deep to very deep.	Foot slopes in shale valleys and at the base of White Oak Mountain.
Light yellowish brown to brownish yellow, or pale yellow to yellowish brown.	Yellowish brown or brownish yellow in the upper part; mottled gray, brownish yellow, and reddish brown in the lower part.	Silty clay loam in the upper part; silty clay or silty clay loam in the lower part.	Moderately deep to very deep.	Foot slopes in shale valleys.
Weak red	Light reddish brown to reddish brown.[2]	Loam[2]	Very shallow to shallow.	Sandstone and shale ridges.
Brown to dark brown	Mottled yellow, gray, and brown.[2]	Silty clay[2]	Deep to very deep	First bottoms.
Pale brown to light yellowish brown, or brownish yellow.	Brownish yellow; below this variegated yellow, yellowish red, and strong brown.[2]	Shaly silt loam or silty clay loam; very shaly silty clay loam in the lower part.[2]	Very shallow to shallow.	Shale ridges.
Grayish brown to dark grayish brown; faintly mottled.	Mottled gray, brown, and yellow in upper part; light gray with a few brown and yellow mottles in the lower part.	Silt loam or silty clay loam in the upper part; silty clay or silty clay loam in the lower part.	Deep to very deep	First bottoms.
Brown to dark brown or yellowish brown in the upper part; yellowish brown or yellowish red in the lower part.	Yellowish red	Silty clay loam or cherty silty clay loam.	Deep to very deep	Foot slopes in cherty ridges.
Pale yellow to dark yellowish brown, light yellowish brown, or brownish yellow.	Brownish yellow to dark yellowish brown.[2]	Shaly silt loam or silty clay loam.[2]	Very shallow to shallow.	Shale valleys and ridges.
Pale brown in the upper part; light yellowish brown in the lower part.	Brownish yellow to yellow in the upper part; mottled light gray, yellow, and reddish yellow in the lower part.	Silty clay loam	Very deep	Low to high stream terraces.
Light brownish gray to light yellowish brown.	Mottled light gray and yellowish brown in the upper part; mottled gray, yellowish brown, and reddish yellow in the lower part.	Silt loam in the upper part; silty clay in the lower part.	Shallow to deep	Shale valleys.
Light yellowish brown to yellowish brown, or brown.	Yellowish brown to strong brown or yellowish red in the upper part; yellowish brown to strong brown mottled with yellowish brown in the lower part.	Silty clay loam, clay loam, or sandy clay loam in the upper part; silty clay in the lower part.	Deep to very deep	Toe slopes in shale valleys.
Light yellowish brown	Yellowish brown to strong brown.[2]	Fine sandy loam to clay loam.[2]	Very shallow to deep.	Sandstone and shale ridges.
Reddish brown to dark reddish brown.	Reddish brown to dark red[2]	Clay loam[2]	Deep to very deep	Narrow strips along intermittent drainageways in limestone valleys.

TABLE 4.—*Major characteristics of the*

Series	Parent material	Position	Dominant relief	Natural drainage
Pace	Old colluvium and local alluvium from uplands underlain chiefly by dolomitic limestone, cherty dolomitic limestone, and dolomitic limestone with sandy layers.	Colluvial slopes	Undulating to rolling	Moderately well drained to well drained.
Prader	Recent general alluvium derived from uplands underlain mainly by sandstone and shale; limestone in places.	Bottom lands	Level to gently undulating	Poorly drained
Purdy	Old general alluvium derived from uplands underlain mainly by shale and sandstone; limestone in places.	Terraces	Level to gently undulating	Poorly drained
Sequatchie	Old general alluvium derived from uplands underlain mainly by sandstone and shale; limestone in places.	Terraces	Undulating	Well drained
Sequoia	Material weathered in place from interbedded limestone and shale, acid shale, or calcareous shale leached of carbonates.	Uplands	Undulating to rolling	Well drained to somewhat excessively drained.
Staser	Recent general alluvium derived from uplands underlain mainly by sandstone and shale; limestone in places.	Bottom lands	Level to gently undulating	Well drained
Talbott	Material weathered in place from clayey limestone.	Uplands	Undulating to rolling	Well drained to somewhat excessively drained.
Tellico	Material weathered in place from calcareous sandstone; contains beds of calcareous shale in some areas.	Uplands	Rolling to steep	Well drained to excessively drained.
Tyler	Old general alluvium derived from uplands underlain mainly by sandstone and shale.	Terraces	Level to gently undulating	Somewhat poorly drained
Waynesboro	Old general alluvium derived from uplands underlain mainly by sandstone, shale, and limestone.	Terraces	Rolling to hilly	Well drained to somewhat excessively drained.
Whitwell	Old general alluvium derived from uplands underlain mainly by shale and sandstone.	Terraces	Level to gently undulating	Somewhat poorly drained to moderately well drained.
Wolftever	Old general alluvium derived from uplands underlain mainly by limestone.	Terraces	Undulating	Moderately well drained

[1] Soil depth is the depth of the soil to significantly different material, such as bedrock or a bed of gravel. It may be expressed in inches as follows: Very shallow, 0 to 8 inches; shallow, 8 to 25 inches; moderately deep, 25 to 35 inches; deep, 35 to 60 inches; and very deep, 60 inches or more.

[2] Subsurface layer.

[3] The Lehew soils are not mapped separately but are mapped with Montevallo soils in the Lehew-Montevallo soil complex.

soil series in Bradley County, Tenn.—Continued

Surface soil color	Subsoil		Soil depth[1]	Typographic position
	Color	Texture		
Pale brown to brown, brownish yellow, or light yellowish brown.	Brownish yellow to yellowish brown; faint mottling in the lower part.	Silty clay loam or cherty silty clay loam.	Deep to very deep.	Foot slopes in cherty ridges.
Light brownish gray	Mottled gray, light brownish gray, and yellowish brown; below this is mottled gray, light brownish gray, yellowish brown, and yellowish red.	Silt loam or silty clay loam in the upper part; silty clay or silty clay loam in the lower part.	Deep to very deep.	First bottoms.
Light brownish gray to grayish brown in the upper part; light gray mottled with yellow in the lower part.	Mottled gray and yellow	Silt loam to silty clay loam	Deep to very deep.	High to low stream terraces.
Dark brown	Dark yellowish brown to brown grading with depth to strong brown; yellowish brown in the lower part.	Clay loam	Very deep	Low stream terraces.
Brown in the upper part; reddish yellow in the lower part.	Reddish yellow to strong brown in the upper part; reddish yellow in the lower part.	Silty clay loam in the upper part; silty clay loam grading with depth to silty clay in the lower part.	Very shallow to deep.	Low shale ridges.
Brown to dark brown	Yellowish brown to dark yellowish brown.[2]	Silt loam, sandy clay loam, or clay loam.[2]	Deep to very deep.	First bottoms.
Brown to dark brown or reddish brown.	Yellowish red in the upper part; reddish brown in the lower part.	Silty clay loam grading with depth to silty clay.	Shallow to very deep.	Limestone valleys.
Dark red or dusky red	Dark reddish brown in the upper part; dark reddish brown grading with depth to reddish brown or red in the lower part.	Clay loam or silty clay loam in the upper part; sandy clay, sandy clay loam, silty clay or silty clay loam in the lower part.	Shallow to very deep.	Steep calcareous sandstone ridges.
Pale brown to light yellowish brown.	Light yellowish brown in the upper part; gray mottled with yellow and brown in the lower part.	Silt loam in the upper part; silty clay in the lower part.	Deep to very deep.	High to low stream terraces.
Brown to dark brown in the upper part; dark brown to reddish brown in the lower part.	Yellowish red grading with depth to red.	Clay loam or cobbly clay loam.	Shallow to very deep.	High stream terraces.
Brown to dark brown in the upper part; brown to yellowish brown in the lower part.	Brownish yellow in the upper part; brownish yellow mottled with strong brown and gray in the lower part.	Loam or clay loam in the upper part; clay loam in the lower part.	Deep to very deep.	Low stream terraces.
Brown to dark brown	Strong brown or yellowish brown.	Silt loam or silty clay loam in the upper part; silty clay loam in the lower part.	Deep to very deep.	Low stream terraces.

[4] The Montevallo soils are mapped separately, with Lehew soils in the Lehew-Montevallo soil complex, and with the Muskingum soils in the Montevallo and Muskingum undifferentiated soil group.

[5] The Muskingum soils are not mapped separately but are mapped with Montevallo soils in the Montevallo and Muskingum undifferentiated soil group.

(3) sandstone. These main types of rocks also occur as interstratified formations that give rise to other soil series.

Material weathered in place from limestone.—In this group are soils of the Decatur, Dewey, Talbott, Colbert, Dowellton, Fullerton, Clarksville, and Bolton series. The composition of the parent rock varies from the high-grade limestone under the Decatur and Dewey soils to the cherty dolomitic limestone under the Fullerton and Clarksville soils. The Bolton soils are underlain by limestone that is sandy and similar to that underlying the Fullerton loam soils. The limestone parent material of the Colbert, Talbott, and Dowellton soils is relatively free of chert or sand. Its residuum is high in clay.

The subsoils of the Decatur soils are red or dark red; those of the Dewey and Fullerton soils are yellowish red to red; and those of the Clarksville soils are brownish yellow to pale yellow. The color of the surface soils grades from dark to light, and natural fertility decreases in the same order from the Decatur to the Clarksville soils. The quantity of chert and resistance to erosion, however, increase in the same order. In color, the Bolton soils are somewhat similar to the Dewey soils, but the Bolton soils occupy higher positions on cherty ridges and generally they have a fluffy or resilient reddish-brown to brown surface soil. The principal distinguishing characteristic of the soils of the Talbott, Colbert, and Dowellton series is their firm or very firm subsoil, which is very plastic when wet.

Material weathered in place from calcareous sandstone.—This group consists only of the soils of the Tellico series. The rock underlying these soils is mainly calcareous sandstone, but it contains calcareous shale in some areas. The soils are characterized by their dark reddish-brown or dusky red, friable fine sandy loam to silty clay loam surface soils and dark reddish-brown to red, friable to firm subsoils.

Material weathered in place from calcareous shale.—This group consists only of the soils of the Dandridge series. These soils generally are hilly and steep. They range from very shallow to deep over calcareous shale. They have a light yellowish-brown to brown or pale-brown shaly or very shaly surface soil. The surface soil is underlain by yellow, gray, brown, or black shale fragments mixed with yellowish-brown soil material. In many places large shale fragments or flaggy pieces are common on the surface.

Material weathered in place from interbedded limestone and shale, or interbedded acid and calcareous shale.—In this group are soils of the Farragut, Sequoia, and Litz series. These soils are underlain by shale but contain material from limestone. In most places the soils have formed chiefly from interbedded acid and calcareous shale or acid shale containing thin lenses of limestone.

The Farragut soils contain more limestone materials than the Sequoia soils, and the Sequoia soils, more than the Litz soils. Outcrops of limestone bedrock are more common in the Farragut soils than in either the Sequoia or Litz soils.

The Farragut soils have dark-brown through dark reddish-brown to red, friable to firm surface soils and reddish-brown through yellowish-red to red, firm subsoils.

The Sequoia soils have brown to reddish-yellow friable surface soils and reddish-yellow to strong-brown very firm subsoils. They are generally lighter in color and less fertile than the Farragut soils.

The Litz soils are very shallow to shallow. They have pale-brown to yellowish-brown or brownish-yellow friable shaly silt loam or shaly silty clay loam surface soils, which are underlain by friable silt loam or silty clay loam that is mixed with gray and brown shale fragments. The Litz soils have formed over acid shale that contains a few lenses of limestone.

Material weathered in place from acid shale, interbedded acid shale and sandstone, or acid sandstone.—In this group are soils of the Apison, Conasauga, Mullins, Montevallo, Lehew, and Muskingum series.

The rocks that underlie the Apison, Conasauga, Mullins, and Montevallo soils are chiefly acid shale. They contain sandstone in places. The Lehew soils have formed over dusky-red or weak-red acid sandstone and shale, and the Muskingum soils have formed over acid sandstone.

The Apison soils have friable silt loam surface soils and friable silt loam or silty clay loam subsoils.

The Conasauga soils are similar to the Apison soils but generally have milder relief and poorer drainage.

The Mullins soils differ from the Apison soils chiefly because they are nearly level and have poor drainage. The subsoil of the Mullins soils is mottled throughout.

The excessively drained Montevallo soils are very shallow to shallow and dominantly rolling and hilly. In some areas they contain many shale fragments.

The excessively drained Lehew soils are conspicuous because of their purplish cast, dominantly steep slopes, and very shallow to shallow depth to sandstone and shale.

The excessively drained Muskingum soils have very friable fine sandy loam surface soils and very friable to friable, heavy fine sandy loam to clay loam subsurface layers. They are very shallow to deep over acid sandstone bedrock.

Soils of Colluvial Slopes

The soils of colluvial slopes are the Hermitage, Pace, Minvale, Alcoa, Muse, Jefferson, Leadvale, Emory, Greendale, Neubert, Cotaco, and Barbourville. They occur in areas where the soil material from adjacent lands has accumulated at the foot of slopes, around the heads of drainageways, and along intermittent drainageways. These soils have formed from old colluvium and local alluvium. Their relief is largely nearly level, undulating, and rolling. Their parent materials were derived from soil materials and rock fragments that were washed and rolled from higher lying slopes.

Some of the soils of colluvial slopes consist of materials that have lain in place for a long time and that have good drainage and well-defined surface soil and subsoil layers. These soils are on the higher lying colluvial areas.

Some soils of the colluvial slopes consist of materials that have been in place for a short time, and there is only a little or weak distinction between the surface soil and the subsoil layers. These soils occupy lower lying positions and have very gentle slopes. Much of their acreage lies adjacent to intermittent drainageways and has impaired drainage.

The Hermitage, Pace, and Minvale soils were derived mainly from materials that were washed from soils underlain by limestone. The Alcoa, Muse, Jefferson, and Leadvale soils were derived from materials moved from soils underlain by sandstone, shale, or both.

The Emory soil is dark colored and has washed from soils derived mainly from high-grade limestone.

The Greendale soils are light colored and have formed from materials washed from Fullerton or Clarksville soils.

The Neubert soil was derived from materials washed from soils that formed over calcareous sandstone.

The Barbourville soils were derived from well-drained recent colluvium originating from sandstone or shale or from mixed sandstone and shale.

The Cotaco soils were derived from the same type of materials as the Barbourville but are somewhat poorly drained to moderately well drained.

Soils of Terraces

The soils of the terraces are members of the Cumberland, Etowah, Capshaw, Waynesboro, Holston, Monongahela, Tyler, Purdy, Wolftever, Sequatchie, and Whitwell series. The terraces were formed in the geologic past when the Hiwassee River and other streams were at higher levels and deposited gravel, sand, silt, and clay on their flood plains. During the progress of stream cutting that continued for a great number of years, the stream channels gradually deepened. New flood plains were formed at lower levels, and the higher lying, older flood plains remained as terraces.

The soils on the terraces lie above the overflow of present streams. In position, they are between the soils of the uplands and those of the bottom lands. They have formed from old alluvium. They differ mainly in degree of internal drainage, but to some extent they also differ in parent materials.

The Cumberland and Etowah soils, on the high stream terraces, were derived from old mixed alluvium that contained a high proportion of materials of limestone origin.

The Wolftever soils are on low terraces, and the Capshaw soils are on terraces ranging from low to high.

The Waynesboro soils occupy high terraces, and the Holston soils, moderately high to high terraces. Both series were derived from old mixed alluvium that contains mainly sandstone and shale materials but includes some limestone materials.

The Monongahela soil is on low to high terraces, is moderately well drained, and was derived from alluvial material that came mainly from sandstone and shale.

The Sequatchie and Whitwell soils are on low stream terraces, and the Tyler and Purdy soils are on high to low stream terraces. Soils of these four series were formed from old alluvium and derived chiefly from sandstone and shale materials, but in places some of their material was washed from uplands underlain by limestone or calcareous shale. In this group of four series, the Sequatchie is well drained; the Whitwell, somewhat poorly drained to moderately well drained; the Tyler, somewhat poorly drained; and the Purdy, poorly drained.

Soils of Bottom Lands

The soils of the bottom lands are members of the Huntington, Lindside, Melvin, Staser, Hamblen, Prader, and Bruno series. The soils occupy level areas adjacent to streams and are subject to overflow. They are forming in materials so recently deposited that there has not been time enough for development of well-defined surface soils and subsoils. The characteristics of the soils depend largely on the parent material, which has been mixed and sorted in various ways by flowing water.

The Huntington, Lindside, and Melvin soils are developing in materials that originally weathered from limestone. The Huntington soils are well drained. From the surface downward, the colors grade from reddish-brown through dark brown to brown. The Lindside soil is somewhat poorly drained; it has a brown to dark-brown surface soil, and below the surface soil it is mottled yellowish brown, gray, and brown. The Melvin soil is poorly drained; it has a grayish-brown to dark grayish-brown surface soil. The upper part of the Melvin subsoil is prominently mottled with gray, brown, and yellow; the lower part is light gray with a few brown and yellow mottles.

The Staser, Hamblen, and Prader soils are developing from a mixture of materials that originally weathered from shale, limestone, and sandstone. The Staser soils are well drained and predominantly brownish throughout the profile. The Hamblen soil is somewhat poorly drained and has a pale-brown to brown surface soil. The Hamblen subsoil, to depths of 22 to 28 inches, is yellowish brown mottled with brown and gray. The Prader soil is poorly drained; it has a light brownish-gray surface layer and is mottled below this layer.

The Bruno soil, which occupies a small acreage on the bottom lands, consists largely of very friable loamy fine sand. It is forming in recent general alluvium derived from uplands that are underlain mainly by sandstone, quartzite, sandy shale, sandy dolomitic limestone, and calcareous sandstone. The Bruno soil is very deep, excessively drained, and very low in natural fertility.

Classification of Soils

The soil series of Bradley County are classified by orders and great soil groups in table 5. The parent material, dominant relief, and time, which is expressed

TABLE 5.—*Soil series arranged according to higher categories*

ZONAL

Great soil group and series	Parent material	Dominant relief	Degree of profile development	
			As indicated by number of significant genetic layers	As indicated by contrast in horizon
Red-Yellow Podzolic:				
Red members:				
	Residuum from weathering of—			
Dewey	High-grade limestone	Rolling	Strong	Medium.
Fullerton	Dolomitic limestone, cherty dolomitic limestone, or dolomitic limestone with thin sandy layers.	Rolling to hilly	Strong	Strong.
Minvale	Old colluvial and local alluvial accumulations from uplands underlain chiefly by cherty limestone.	Rolling	Strong	Strong.
Sequoia	Interbedded limestone and shale, acid shale, or calcareous shale leached of carbonates.	Undulating to rolling	Strong	Strong.
Talbott	Clayey (argillaceous) limestone.	Undulating to rolling	Strong	Strong.
Tellico	Calcareous sandstone that contains beds of calcareous shale in some areas.	Rolling to steep	Medium	Medium.
	Old general alluvium derived from uplands underlain mainly by—			
Etowah	Limestone	Undulating to rolling	Strong	Medium.
Waynesboro	Sandstone, shale, and limestone	Rolling to hilly	Medium	Medium.
Yellow members:				
	Residuum from weathering of—			
Apison	Acid shale, or interbedded acid shale and sandstone.	Undulating to rolling	Strong	Strong.
Clarksville	Cherty dolomitic limestone	Rolling to hilly	Medium	Medium.
	Old colluvial and local alluvial accumulations from uplands underlain chiefly by—			
Jefferson	Shale and sandstone	Rolling	Strong	Strong.
Muse	Shale	Undulating to rolling	Strong	Strong.
Pace	Dolomitic limestone, cherty dolomitic limestone, and dolomitic limestone with sandy layers.	Undulating to rolling	Strong	Strong.
	Old general alluvium derived from uplands underlain mainly by—			
Capshaw	Limestone	Undulating	Strong	Strong.
Holston	Sandstone, shale, and limestone.	Undulating to rolling	Strong	Strong.
Reddish-Brown Lateritic:				
	Residuum from weathering of—			
Bolton	Sandy dolomitic limestone	Rolling to hilly	Medium	Medium.
Decatur	High-grade limestone	Undulating to rolling	Medium	Medium.
Farragut	Interbedded limestone and shale.	Undulating to rolling	Medium	Medium.
	Old colluvial and local alluvial accumulations from uplands underlain chiefly by—			
Alcoa	Calcareous sandstone	Rolling	Medium	Medium.
Hermitage	High-grade limestone	Undulating to rolling	Strong	Medium.
Cumberland	Old general alluvium derived from uplands underlain mainly by limestone but in places by sandstone, shale, and quartzite.	Undulating to rolling	Medium	Medium.
Gray-Brown Podzolic:				
	Old general alluvium derived from uplands underlain mainly by—			
Sequatchie	Sandstone and shale but by limestone in places.	Undulating	Medium	Medium.
Whitwell	Shale and sandstone	Level to gently undulating	Medium	Weak.

Footnotes at end of table.

TABLE 5.—*Soil series arranged according to higher categories.*—Continued

Great soil group and series	Parent material	Dominant relief	Degree of profile development	
			As indicated by number of significant genetic layers	As indicated by contrast in horizon
INTRAZONAL				
Planosol:				
Fragipans:				
Leadvale	Old colluvial and local alluvial accumulations from uplands underlain chiefly by shale and sandstone but by limestone in places.	Undulating	Very strong	Strong.
Mullins	Residuum from weathering of acid shale, or interbedded acid shale and sandstone.	Nearly level	Strong	Strong.
	Old general alluvium derived from uplands underlain mainly by—			
Monongahela	Sandstone and shale but by limestone in places.	Undulating	Strong	Strong.
Purdy	Shale and sandstone but by limestone in places.	Level to gently undulating	Strong	Strong.
Tyler	Sandstone and shale	Level to gently undulating	Strong	Medium.
Wolftever	Limestone	Undulating	Medium	Medium.
Argipans:				
	Residuum from weathering of—			
Colbert	Clayey (argillaceous) limestone.	Undulating to rolling	Strong	Strong.
Conasauga	Acid shale, or interbedded acid shale and sandstone.	Undulating	Medium	Medium.
Dowellton	Clayey (argillaceous) limestone.	Level to undulating	Medium	Medium.
Low-Humic Gley:				
	Recent general alluvium derived from uplands underlain mainly by—			
Melvin	Limestone	Level to gently undulating	Weak	Strong.
Prader	Sandstone and shale but by limestone in places.	Level to gently undulating	Weak	Medium.
AZONAL				
Lithosols:				
	Residuum from weathering of—			
Dandridge	Calcareous shale	Hilly to steep	Weak	Weak.
Lehew[1]	Acid sandstone and shale	Steep	Weak	Weak.
Litz	Acid shale containing a few limestone layers.	Rolling to hilly	Weak	Weak.
Montevallo[2]	Acid shale, or interbedded acid sandstone and shale.	Rolling to hilly	Weak	Weak.
Muskingum[3]	Acid sandstone	Steep	Weak	Weak.
Alluvial soils:				
	Local alluvial and colluvial accumulations from uplands underlain by—			
Barbourville	Acid sandstone and sandy shale.	Rolling	Very weak	Very weak.
Cotaco	Shale, sandstone, or both, and by limestone in places.	Nearly level to gently sloping.	Weak	Medium.
Emory	High-grade limestone chiefly	Level to undulating	Very weak	Very weak.
Greendale	Dolomitic limestone and cherty dolomitic limestone.	Gently sloping	Weak	Weak.
Neubert	Calcareous sandstone or shaly sandstone.	Level to undulating	Very weak	Very weak.
	Recent general alluvium derived from uplands underlain mainly by—			
Bruno	Sandstone, quartzite, sandy shale, sandy dolomitic limestone, and calcareous sandstone.	Level to gently undulating	Very weak	Very weak.
Hamblen	Sandstone and shale but by limestone in places.	Nearly level	Weak	Weak.
Huntington	Limestone	Level to gently undulating	Very weak	Very weak.
Lindside	Limestone	Level to gently undulating	Weak	Medium.
Staser	Sandstone and shale but by limestone in places.	Level to gently undulating	Very weak	Very weak.

[1] The Lehew soils are not mapped separately but are mapped with Montevallo soils in the Lehew-Montevallo soil complex.

[2] The Montevallo soils are mapped separately, with Lehew soils in the Lehew-Montevallo soil complex, and with the Muskingum soils in the Montevallo and Muskingum undifferentiated soil group.

[3] The Muskingum soils are not mapped separately but are mapped with Montevallo soils in the Montevallo and Muskingum undifferentiated soil group.

TABLE 6.—*Approximate acreage and proportionate extent of soils mapped*

Soil	Area	Extent
	Acres	*Percent*
Alcoa loam, eroded rolling phase	317	0.1
Apison silt loam:		
Undulating phase	1,372	.6
Eroded undulating phase	3,491	1.6
Rolling phase	1,810	.8
Eroded rolling phase	3,195	1.5
Severely eroded rolling phase	315	.2
Barbourville loam	915	.4
Barbourville stony loam	219	.1
Bolton silt loam:		
Eroded hilly phase	741	.3
Eroded rolling phase	766	.3
Eroded steep phase	163	(1)
Bruno loamy fine sand	176	(1)
Capshaw silt loam, undulating phase	388	.2
Clarksville cherty silt loam:		
Rolling phase	3,133	1.4
Eroded rolling phase	2,662	1.3
Hilly phase	3,925	1.8
Eroded hilly phase	1,744	.8
Steep phase	2,950	1.4
Colbert silty clay:		
Eroded undulating phase	166	(1)
Eroded rolling phase	215	(1)
Conasauga silt loam:		
Undulating phase	1,443	.7
Eroded undulating phase	2,077	1.0
Level phase	320	.1
Cotaco silt loam	5,766	2.8
Cotaco loam	973	.4
Cumberland silty clay loam:		
Eroded undulating phase	456	.2
Eroded rolling phase	681	.3
Severely eroded rolling phase	142	(1)
Severely eroded hilly phase	102	(1)
Dandridge shaly silt loam:		
Hilly phase	109	(1)
Eroded hilly phase	328	.2
Eroded rolling phase	234	.1
Steep phase	179	(1)
Eroded steep phase	160	(1)
Decatur silty clay loam:		
Eroded undulating phase	186	(1)
Eroded rolling phase	155	(1)
Dewey silty clay loam:		
Eroded undulating phase	211	(1)
Eroded rolling phase	904	.4
Dewey silty clay, severely eroded rolling phase	101	(1)
Dowellton silty clay loam	233	.1
Emory silt loam	2,692	1.3
Etowah silt loam:		
Undulating phase	324	.2
Eroded undulating phase	845	.4
Eroded rolling phase	853	.4
Farragut silty clay loam:		
Eroded undulating phase	1,476	.7
Eroded rolling phase	1,330	.6
Farragut silty clay, severely eroded rolling phase	428	.2
Fullerton silt loam:		
Rolling phase	155	(1)
Eroded rolling phase	3,335	1.6
Eroded undulating phase	520	.2
Eroded hilly phase	841	.4
Fullerton silty clay loam:		
Severely eroded rolling phase	259	.1
Severely eroded hilly phase	328	.2
Fullerton cherty silt loam:		
Rolling phase	3,195	1.6
Eroded rolling phase	6,167	2.9
Hilly phase	5,347	2.6
Eroded hilly phase	6,278	2.9
Steep phase	3,942	1.8
Eroded steep phase	876	.4
Fullerton cherty silty clay loam:		
Severely eroded rolling phase	143	(1)
Severely eroded hilly phase	745	.3
Severely eroded steep phase	115	(1)
Fullerton loam:		
Eroded rolling phase	700	.3
Eroded hilly phase	116	(1)
Greendale silt loam	2,314	1.1
Greendale cherty silt loam	1,280	.6
Gullied land:		
Shale soil materials	2,325	1.1
Calcareous sandstone soil materials	281	.1
Limestone soil materials	249	.1
Hamblen silt loam	5,376	2.6
Hermitage silt loam:		
Undulating phase	1,080	.5
Eroded undulating phase	627	.3
Eroded rolling phase	1,305	.6
Holston loam:		
Eroded undulating phase	236	.1
Eroded rolling phase	124	(1)
Huntington silt loam	329	.2
Huntington loam	203	(1)
Jefferson loam:		
Eroded undulating phase	469	.2
Rolling phase	276	.1
Eroded rolling phase	1,026	.5
Leadvale silt loam:		
Undulating phase	1,555	.7
Eroded undulating phase	1,246	.6
Eroded rolling phase	771	.4
Lehew-Montevallo loams:		
Hilly phases	1,855	.9
Eroded hilly phases	1,607	.7
Rolling phases	1,818	.8
Eroded rolling phases	944	.4
Steep phases	7,378	3.5
Eroded steep phases	1,122	.5
Lindside silt loam	1,395	.6
Litz shaly silt loam:		
Rolling phase	240	.1
Eroded rolling phase	2,169	1.0
Eroded undulating phase	238	.1
Hilly phase	687	.3
Eroded hilly phase	1,326	.6
Melvin silt loam	1,208	.6
Mines, pits, and dumps	24	(1)
Minvale silt loam:		
Undulating phase	376	.2
Eroded undulating phase	797	.4
Rolling phase	236	.1
Eroded rolling phase	3,680	1.7
Minvale cherty silt loam:		
Rolling phase	274	.1
Eroded rolling phase	1,452	.7
Monongahela silt loam, undulating phase	886	.4
Montevallo shaly silt loam:		
Rolling phase	4,967	2.3
Eroded rolling phase	12,508	5.9
Eroded undulating phase	867	.4
Hilly phase	5,685	2.7
Eroded hilly phase	5,786	2.8
Montevallo and Muskingum soils:		
Rolling phases	564	.3
Hilly phases	682	.3
Steep phases	4,807	2.3
Mullins silt loam	569	.3
Muse silt loam:		
Undulating phase	223	.1
Eroded undulating phase	868	.4
Rolling phase	264	.1
Eroded rolling phase	2,275	1.1
Eroded hilly phase	194	(1)
Neubert loam	577	.3

TABLE 6.—*Approximate acreage and proportionate extent of soils mapped.*—Continued

Soil	Area	Extent
	Acres	*Percent*
Pace silt loam:		
Undulating phase	973	.4
Eroded undulating phase	1,386	.6
Eroded rolling phase	869	.4
Pace cherty silt loam:		
Rolling phase	952	.5
Eroded rolling phase	1,058	.5
Prader silt loam	3,247	1.5
Purdy silt loam	808	.4
Rockland, limestone	223	.1
Sequatchie loam, undulating phase	723	.3
Sequoia silt loam:		
Undulating phase	260	.1
Rolling phase	479	.2
Sequoia silty clay loam:		
Eroded undulating phase	5,706	2.7
Eroded rolling phase	8,970	4.3
Sequoia silty clay, severely eroded rolling phase	3,670	1.7
Staser silt loam	1,926	.9
Staser loam	1,258	.6
Stony rolling and hilly land, limestone	621	.3
Talbott silty clay loam:		
Eroded undulating phase	239	.1
Eroded rolling phase	391	.2
Talbott silty clay, severely eroded rolling phase	117	(1)
Tellico fine sandy loam:		
Eroded rolling phase	313	.1
Eroded hilly phase	127	(1)
Steep phase	239	.1
Eroded steep phase	194	(1)
Tellico clay loam:		
Severely eroded hilly phase	277	.1
Severely eroded steep phase	277	.1
Tellico silt loam, eroded rolling phase	272	.1
Tellico silty clay loam, severely eroded hilly phase	436	.2
Tyler silt loam	1,069	.5
Waynesboro loam, eroded rolling phase	225	.1
Waynesboro cobbly loam:		
Eroded rolling phase	253	.1
Eroded hilly phase	220	.1
Whitwell loam	268	.1
Wolftever silt loam, undulating phase	232	.1
Total land area	214,331	98.5
Water	1,989	1.5
Total area	216,320	100.0

[1] Less than 0.1 percent.

by degree of profile development, are shown for each series. This table is primarily for the use of soil scientists.

Soil Types and Phases

In the following pages the soil types and phases of Bradley County are described in detail and their use for agriculture is discussed. The soils are listed in alphabetical order by series name and are identified by the same symbols as those shown on the soil map in the back of this report. The soil map shows the location and distribution of all the soils. Approximate acreage and proportionate extent of the soils mapped are given in table 6. For definitions of special terms used in the soil descriptions see the glossary, p. 93.

Alcoa loam, eroded rolling phase (5 to 12 percent slopes) (Aa).—This well-drained soil has formed from old colluvium and local alluvium that was derived from uplands underlain by calcareous sandstone. The parent materials have washed chiefly from Tellico soils and were deposited mostly in areas underlain by shale. Small irregular areas of this soil occur at the base of slopes from which the parent materials have washed. The soil has developed under hardwoods. It occurs in the extreme southern and northeastern parts of the county, where it is closely associated with the soils of the Tellico and Neubert series.

Profile description:

Surface soil—
0 to 10 inches, dark reddish-brown friable loam; weak fine crumb structure.

Subsoil—
10 to 20 inches, yellowish-red friable clay loam or silty clay loam; weak medium blocky structure that crushes to moderate medium granular.
20 to 28 inches, yellowish-red friable clay loam; plastic when wet; moderate medium blocky structure that crushes to moderate medium granular.

Underlying material—
28 to 60 inches +, red friable to firm silty clay loam containing olive-yellow spots or streaks; shale bedrock, or in places, calcareous sandstone at depths of 2 to 8 feet.

The surface soil is 8 to 12 inches thick, and the subsoil, 16 to 22 inches in places. Most of the soil has been moderately eroded. The eroded areas differ from the wooded areas in having lost part of the surface soil, including the thin top layer that was high in organic matter. In the plow layer some surface soil has been mixed with the subsoil. Consequently, the present surface soil varies in thickness, color, and texture.

This soil includes about 30 acres of Alcoa loam, virtually uneroded and in woodland. Generally, relief is undulating and rolling, but it is hilly in places. Also included are about 10 acres of Alcoa loam, eroded undulating phase, and about 15 acres of Alcoa clay loam, severely eroded rolling phase.

Alcoa loam, eroded rolling phase, is medium to strongly acid. It contains a moderate supply of organic matter and has a medium content of plant nutrients. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity of the soil is moderate, and workability of the soil is good. Risk of erosion is moderate to high. Productivity is medium.

Use suitability (group 9)[5].—Almost all of this soil is used for crops and pasture (fig. 2). It is well suited to all crops commonly grown in the county. Good fertility, favorable permeability, and good tilth make

[5] Denotes the management group into which the soil has been placed. See section, How to Use and Manage the Soils.

Figure 2.—**Corn on Alcoa loam, eroded rolling phase; pine trees on Tellico clay loam, severely eroded hilly phase, in left background.**

this soil fairly well suited to alfalfa, tobacco, cotton, and various truck crops. However, since this soil is susceptible to further erosion, it is not suited to intensive use. Moderately long rotations are required, and field operations can be performed to best advantage on the contour. The soil is well suited to pasture. Herbage of high quality and good carrying capacity can be maintained where the soil is well fertilized and seeded with a good grass mixture.

Apison silt loam, undulating phase (2 to 5 percent slopes) (Af).—This is a well-drained friable soil of the uplands. It has formed from weathered acid shale, or interbedded acid shale and sandstone, under hardwoods, chiefly oak and hickory. The soil is widely distributed throughout the county, but much of it is in the Coahulla Creek drainage basin. It is closely associated with Montevallo soils and other Apison soils of the uplands and with Cotaco soils along minor drainageways.

Profile description:

Surface soil—
0 to 8 inches, light brownish-gray friable silt loam; weak medium granular structure.

Subsoil—
8 to 16 inches, brownish-yellow friable heavy silt loam or light silty clay loam; weak fine blocky structure.
16 to 28 inches, mottled brownish-yellow and reddish-yellow friable silt loam or silty clay loam; weak fine blocky structure.

Parent material—
28 inches +, partly weathered acid shale and sandstone; total depth to bedrock of acid shale or interbedded acid shale and sandstone ranges from 2 to 3½ feet.

In places there is gray mottling in the lower part of the subsoil.

The soil is medium to strongly acid and low in organic matter. It is deficient in plant nutrients, especially phosphorus. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate. The soil has very good workability.

Use suitability (group 8).—Most of the soil is in forest. Much of the timber has been cut over several times. The forest consists chiefly of oak, pine, and some hickory.

This soil is fair for crops, but its suitability is limited by low fertility and moderate moisture-supplying capacity. It is best suited to cotton or other drought-resistant crops, or to such early maturing crops as small grains. It is poorly suited to alfalfa, even under good management, and is somewhat droughty for corn. Cultivated areas respond to fertilizer but need frequent applications. When the soil is adequately fertilized, yields of corn, small grains, cotton, and lespedeza are fair.

Apison silt loam, eroded undulating phase (2 to 5 percent slopes) (Ac).—This soil differs from Apison silt loam, undulating phase, mainly in being eroded. In cultivated areas the surface soil has been mixed with subsoil material in the plow layer. As a result the present surface layer varies more in thickness, color, and texture.

This soil is widely distributed over the county, but the greatest acreage is in the southern part in the area drained by Coahulla Creek. The soil is associated with Montevallo and Cotaco soils and with other Apison soils.

The plow layer is a yellowish-brown friable silt loam. The upper 6 to 8 inches of the subsoil consists of brownish-yellow friable heavy silt loam or light silty clay loam. The lower 12 inches consists of mottled brownish-yellow and reddish-yellow friable silt loam or silty clay loam. In some areas gray mottles or splotches occur at depths of 18 to 24 inches. Bedrock underlies the soil at 1½ to 3 feet, but partly weathered shale or sandstone can occur between the subsoil and the bedrock.

The soil is medium to strongly acid throughout. It is low in organic matter and plant nutrients. Permeability is moderate in the plow layer and moderately slow in the subsoil. Although the soil absorbs water fairly readily, its moisture-supplying capacity is only moderate. Workability is good.

Use suitability (group 8).—Practically all this soil is used for crops. Only a small part is idle or in pasture. The soil is fairly well suited to the crops most commonly grown in the county, but chiefly because of its low fertility, it has low productivity and somewhat limited use. Cotton, corn, small grains, and lespedeza are successfully grown, but yields are low without the use of fertilizer. Crimson clover grows fairly well if it is properly fertilized. Alfalfa produces low yields and does not last long, even if it is adequately fertilized and otherwise well managed. The soil is somewhat droughty for crops that mature late; it is better for small grains, or such drought-resistant crops as cotton. It is fair for pasture but needs fertilizer if it is to yield satisfactorily.

Apison silt loam, rolling phase (5 to 12 percent slopes) (Ad).—This soil differs from Apison silt loam, undulating phase, chiefly in having stronger slopes, thinner surface soil and subsoil layers, and shallower depth to bedrock. It is practically uneroded. The soil occurs mostly in acid shale areas. It is widely distributed throughout the county, but its greatest acreage is in the southern part. This soil is associated with other Apison soils.

The surface soil, about 6 inches thick, is light brownish-gray friable silt loam. The subsoil is brownish-yellow friable heavy silt loam or silty clay loam in the upper 6 inches and, in the lower 10 inches, is mottled brownish-yellow and reddish-yellow friable silt loam or silty clay loam. In some places the subsoil overlies partly weathered shale or sandstone. Bedrock occurs at depths of 1 to 2½ feet.

The soil is strongly acid and low in organic matter. It needs nitrogen and phosphorus, and possibly potash. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate to low. If cleared, the soil would have good workability. It would respond well to fertilizer, but because of leaching, frequent applications would be needed.

Use suitability (group 13).—The greater part of this soil is in cutover timber. A very small part has been cleared and is used for pasture. Yields of most crops would be low, chiefly because of the low fertility and moderate to low moisture-supplying capacity. The soil is suited to corn, cotton, small grains, and hay crops, but it is better for cotton and small grains than corn. It is poor for alfalfa and other deep-rooted legumes but well suited to lespedeza. Fertilizers are necessary for satisfactory yields of all crops, and lime is needed for legumes.

Apison silt loam, eroded rolling phase (5 to 12 percent slopes) (Ab).—This soil is similar to Apison silt loam, undulating phase, in most characteristics, but it differs in having stronger slopes, moderate erosion, and less depth to bedrock. The soil is moderately to highly susceptible to further erosion. The largest areas are in the southern part, but the soil is widely distributed throughout the county. This soil is associated with the Montevallo and Cotaco soils and with other Apison soils.

The plow layer is yellowish-brown friable silt loam. The upper 5 inches of the subsoil is brownish-yellow heavy silt loam or silty clay loam, and the lower 10 inches is mottled brownish-yellow and reddish-yellow friable silt loam or silty clay loam. In some areas the lower part of the subsoil contains gray mottles. In places weathered shale or sandstone underlies the subsoil. A few shallow and deep gullies have formed. Depths to bedrock range from 1 to 2 feet.

The soil is strongly acid, low in organic matter, and low in fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil. Because of its shallow depth to bedrock and the moderately slow permeability of its subsoil, the soil has a low moisture-supplying capacity. Workability is fair to good.

Use suitability (group 13).—All of this soil has been cleared and is now used chiefly for crops and pasture. A considerable acreage is idle.

The soil is suited to crops and pasture, but because of its low fertility and low moisture-supplying capacity, its use suitability is limited. The soil is poor for alfalfa. Corn, even if fertilized, produces only fair yields. Early maturing crops such as small grains, or cotton or other drought-resistant crops, are better suited than late-maturing crops. The soil is moderately well suited to pasture if it is properly limed, fertilized, and otherwise well managed.

Apison silt loam, severely eroded rolling phase (5 to 12 percent slopes) (Ae).—This somewhat excessively drained soil differs from Apison silt loam, undulating phase, in having severe erosion, stronger slopes, and a much lower moisture-supplying capacity. Practically all of the original surface soil has been lost through erosion, and tillage is mostly or entirely in the subsoil. Closely spaced short gullies have been formed. Most of these gullies can be crossed with farm machinery, but some are too deep. In many places the subsoil is also eroded. This soil is widely distributed throughout the county. It is associated with Montevallo and Cotaco soils and with other Apison soils.

The present plow layer consists of brownish-yellow friable heavy silt loam to silty clay loam. The subsoil averages about 10 inches in thickness, but in some places it is very thin or almost lacking. It consists of mottled brownish-yellow and reddish-yellow friable silt loam or silty clay loam. In some places gray mottles or splotches occur in the lower part of the subsoil. Bedrock of acid shale or interstratified acid shale and sandstone lies at depths of ½ to 1½ feet.

The soil is strongly acid. It is very low in organic matter and fertility. Permeability is moderately slow throughout. The moisture-supplying capacity is very low. Workability is poor to fair. Runoff is rapid, and the risk of further erosion is high.

Use suitability (group 16).—This soil has limited suitability for agriculture. It is poorly suited to crops and pasture, but pasture may be its best use. Proper seeding and considerable lime and fertilizer are required to establish and maintain desirable pasture. The droughtiness of the soil greatly limits the periods during which the pastures can be grazed.

Barbourville loam (2 to 7 percent slopes) (Ba).—This well-drained to moderately well drained soil of the colluvial lands consists of materials originating from acid sandstone and sandy shale. The soil occurs in small nearly level to gently sloping areas at the head of drains and at the base of slopes occupied by Lehew-Montevallo, Jefferson, and Litz soils. Most slopes are less than 3 percent. The soil is in the Lehew-Montevallo-Cotaco soil association in the western part of the county.

Profile description:

Surface soil—
0 to 10 inches, grayish-brown to brown, very friable loam; weak fine crumb structure.

Subsurface layer—
10 to 40 inches, brown to yellowish-brown friable fine sandy clay loam; slightly sticky when wet; has a few gray and brown mottles in the lower part.

Underlying material—
40 inches +, friable alluvial or colluvial deposit of variable texture; depths to bedrock range from 2½ to 7 feet.

The surface soil ranges from 8 to 20 inches in thickness. The texture of the subsurface layer varies from heavy loam to sandy clay loam. Where this soil occurs below areas of Lehew-Montevallo soils, its subsurface layer is yellowish red because it contains reddish soil material washed from the Lehew soil. Angular sand-

stone fragments occur in places, but on the whole the soil is relatively free of stone.

The soil is medium to strongly acid, has a moderate content of organic matter, and is medium in fertility. Permeability is moderately rapid throughout. The moisture-supplying capacity is very high. Workability is excellent. Runoff is slow to medium, and risk of erosion is slight to moderate.

Use suitability (group 3).—Most of this soil is used for crops and pasture. About 50 percent is in crops, principally corn and cotton, and about 50 percent is in pasture or is idle. If adequately fertilized, this soil is well suited to intensive use for crops, particularly intertilled crops. Although fair yields of most crops can be obtained without the use of fertilizer, moderate fertilization is needed to get high yields and to maintain productivity. Farmers generally fertilize corn, small grains, cotton, and tobacco, but they do not use systematic crop rotations. For tobacco, vegetables, and corn, a short rotation has proved satisfactory. In places, alfalfa is grown successfully, but the stands last only about 2 years. Control of runoff and erosion is not a problem. In some places, however, deposits of new material washed or sloughed from higher slopes harm crops, and small grains generally are injured more than spring-grown crops.

Barbourville stony loam (2 to 7 percent slopes) (Bb).—This soil differs from Barbourville loam in containing many stones. Most slopes are 3 or 4 percent. This soil is in the western part of the county and is associated with Montevallo, Lehew-Montevallo, Jefferson, and Litz soils. The soil is nearly all in the Lehew-Montevallo-Cotaco soil association.

The surface soil, about 10 inches thick, consists of grayish-brown to brown very friable stony loam. The stones interfere with cultivation. The subsurface layer, about 30 inches thick, consists of brown to yellowish-brown friable stony fine sandy clay loam. It is mottled with gray and brown in the lower part. Below the subsurface layer is an alluvial or colluvial deposit of variable texture that contains a quantity of rock fragments up to about 8 inches in diameter. Bedrock occurs at depths of 2½ to 7 feet. In some places the soil is yellowish-red below the surface soil because the material has washed mainly from Lehew soil of the Lehew-Montevallo soil complex.

The soil is medium to strongly acid, contains a moderate quantity of organic matter, and is medium in fertility. Permeability is moderately rapid throughout the soil, and the moisture-supplying capacity is high. The risk of erosion is slight. Workability is fair to good. Removal of the stones would greatly improve soil workability but, except in very small areas, the cost of removal might not be justifiable. Fair crop and pasture yields are obtained without the use of amendments.

Use suitability (group 3).—A small part of this soil is in hardwoods. Most of the cleared areas are used intensively for crops, but some are used for pasture. Because of its stoniness, this soil is much less desirable for crops than Barbourville loam. It is a fair soil for many crops, including alfalfa. It is well suited to tobacco and vegetables but it is not commonly used for those crops. Although the soil is suited to intensive use, a short rotation that includes a deep-rooted legume is desirable. The soil is well suited to pasture.

Bolton silt loam, eroded hilly phase (12 to 25 percent slopes) (Bc).—This well-drained soil of the uplands has formed from material weathered in place from sandy dolomitic limestone. The surface soil is permeable and somewhat resilient. Much of this soil has been eroded to such a degree that the plow layer now consists of a mixture of surface soil and subsoil material. The soil occurs on northerly and easterly slopes of cherty ridges in the limestone uplands. It is associated with Fullerton and Clarksville soils and is in the Fullerton-Clarksville-Greendale soil association.

Profile description:

Surface soil—
0 to 6 inches, reddish-brown very friable silt loam; weak fine blocky structure.

Subsoil—
6 to 12 inches, dark reddish-brown friable silty clay loam; sticky when wet; weak fine blocky structure.
12 to 36 inches, dark-red to red friable silty clay or silty clay loam; sticky when wet; moderate medium blocky structure.

Parent material—
36 inches +, red friable silty clay or silty clay loam; weak fine blocky structure; bedrock of dolomitic limestone lies at depths of 10 to 30 feet.

The surface soil and subsoil vary considerably in thickness. Considerable fine sand occurs throughout the soil in some places. The subsoil is a clay loam in some areas. In the southern part of the county this soil contains less fine sand than elsewhere, and in some areas its subsoil is firm. In places a few chert fragments are mixed throughout the soil. In some areas the surface soil and subsoil resemble the Decatur soils in color. The soil includes a total of about 5 acres that is virtually uneroded. Also included is a total of about 56 acres that is so severely eroded that nearly all, or all, of the original silt loam surface soil has been washed away.

Bolton silt loam, eroded hilly phase, is medium to strongly acid. It has a moderate supply of organic matter and a medium supply of plant nutrients. Permeability is moderate in the surface soil and moderately slow in the subsoil. The soil absorbs moisture fairly rapidly, and its moisture-supplying capacity is moderate. Risk of further erosion is high. Workability is good. Good tilth is easy to maintain.

Use suitability (group 15).—Nearly all of this soil is used for crops and pasture. A large part is now in pasture or is idle, and the rest is largely in corn, cotton, and hay.

The soil is well suited to pasture. It is fairly well suited to crops. A wide variety of crops, including alfalfa, can be grown. Because this soil is hilly and subject to further erosion, it is not suited to intensive use for tilled crops. The control of soil losses through erosion is one of the major problems of management. Long rotations of small grains and hay are suited. Much of the soil could be used for permanent pasture if it were properly fertilized and seeded.

Bolton silt loam, eroded rolling phase (5 to 12 percent slopes) (Bd).—This soil differs from Bolton silt loam, eroded hilly phase, chiefly in having gentler

slopes. In most places erosion has removed one-fourth to one-half of the original surface soil and has formed a few gullies. The soil is largely on north- and east-facing slopes descending from ridge crests. It is closely associated with Fullerton soils of the cherty ridges and is in the Fullerton-Clarksville-Greendale soil association.

The surface soil, 5 to 10 inches thick, is brown to reddish-brown friable silt loam. The subsoil is dark reddish-brown friable silty clay loam in the upper part and dark-red to red friable silty clay or silty clay loam in the lower part. The average thickness of the upper part of the subsoil is about 6 inches, and that of the lower part ranges from 10 to 28 inches. The subsoil is firm in some places. The material below the subsoil consists of red friable silty clay or silty clay loam. A few chert fragments are mixed through the soil in most places. Bedrock occurs at depths of 10 to 30 feet.

The soil includes a total of about 56 acres that has been little or not at all eroded. Also included is a total of about 9 acres that has been severely eroded and has lost nearly all, or all, of its silt loam surface soil.

Bolton silt loam, eroded rolling phase, is medium to strongly acid, contains a moderate quantity of organic matter, and has a medium content of plant nutrients. Permeability is moderate in the surface soil, and moisture is readily absorbed. Permeability is moderately slow in the subsoil. The moisture-supplying capacity is moderate. Runoff is medium, and the risk of further erosion is moderate. Workability is good.

Use suitability (group 9).—Most of this soil is used for crops and pasture. Only a very small part is idle. The soil is well suited to all crops grown in the county, including alfalfa, tobacco, and market vegetables. It is excellent for fruits and vegetables. Fair yields of most crops can be obtained without application of amendments, but for high yields, substantial fertilization is needed.

Bolton silt loam, eroded steep phase (25 to 60 percent slopes) (Be).—This soil has stronger slopes than Bolton silt loam, eroded hilly phase. Because of increased erosion, the surface soil is thinner and dolomitic limestone bedrock is at shallower depths. The soil is on north- and east-facing slopes and is associated with Fullerton soils, which are on cherty ridges. Most of it is in the Fullerton-Clarksville-Greendale soil association.

The surface soil, a reddish-brown friable silt loam or silty clay loam, ranges from 4 to 8 inches in thickness but averages about 5 inches. The subsoil, in the upper 5 inches, is dark reddish-brown friable silty clay loam. In the lower 20 inches it is dark-red to red friable silty clay or silty clay loam. The upper part of the subsoil ranges from 4 to 8 inches in thickness, and the lower part, from 8 to 24 inches. The material beneath the subsoil is red friable silty clay or silty clay loam. Bedrock underlies the soil at depths of 8 to 24 feet. Gullies have formed in places. The soil includes a total of about 7 acres that is only slightly eroded or not eroded at all. A few acres are severely eroded.

Bolton silt loam, eroded steep phase, is medium to strongly acid. It contains a moderate quantity of organic matter, and its fertility is medium. Permeability is moderate in the surface soil and moderately slow in the subsoil. The soil has a low moisture-supplying capacity. Runoff is rapid to very rapid, and the risk of further erosion is high to very high. Workability is very poor.

Use suitability (group 17).—Most of this soil has been cleared for a number of years. Part is in pasture or idle. The cultivated land is used chiefly for corn, cotton, and lespedeza. Yields from crops and pasture are low under prevailing management. Because of very strong slopes, the soil is poorly suited to crops. If properly fertilized and seeded, it is productive of pasture. Lime and phosphorus probably are the main amendments required for pasture.

Bruno loamy fine sand (0 to 3 percent slopes) (Bf).—This is an excessively drained sandy soil on bottom lands. The parent alluvial material was derived from sandstone and quartzite, and sandy components of sandy shale, sandy dolomitic limestone, and calcareous sandstone. The soil is level to gently undulating. It lies adjacent to the channels of larger streams, chiefly the Hiwassee River. All of it is subject to flooding. Most of it is in the Cumberland-Etowah-Sequatchie soil association.

Profile description:

Surface soil—
0 to 12 inches, light-brown to yellowish-brown very friable loamy fine sand; weak fine crumb structure to single grain.

Subsurface layer—
12 to 36 inches +, brownish-yellow to yellowish-brown very friable loamy fine sand or loam; lighter colored and more sandy in the lower part; bedrock occurs at depths of 5 to 16 feet.

The surface soil ranges from about 10 to 18 inches in thickness. In places faint yellow mottles occur in the profile below a depth of several feet. The areas along the Hiwassee River have many fine mica flakes throughout the soil mass. Areas of alluvial material derived from Tellico soils are red to reddish-brown loamy fine sand to a depth of about 18 inches. Below this is reddish-yellow loamy fine sand that grades into light-colored fine sand.

The soil is slightly to strongly acid and very low in organic matter and fertility. The entire profile is loose and open. Permeability is very rapid. The soil absorbs water quickly, but its moisture-supplying capacity is low. Its position on bottom lands, however, makes moisture accessible in most places. The soil is usually droughty for shallow-rooted crops. There is no risk of erosion, but in certain areas crops may be damaged by scouring, or by heavy deposits of material left by floodwaters. Workability of the soil is very good. The soil can be cultivated when very wet or very dry.

Use suitability (group 2).—Most of this soil is used for crops and pasture. Corn, the chief crop, is grown several years in succession in some fields. Bermudagrass is grown on some of the soil and affords some grazing. Sandiness limits the capability of this soil to produce.

If properly fertilized, the soil is suited to such special crops as melons. Corn grows fairly well if ade-

quately fertilized. Alfalfa produces fairly well for a few seasons, but the soil is better for annual legumes. The more common pasture grasses, especially bermudagrass, maintain a good stand, but growth during the drier parts of the grazing season is limited.

Capshaw silt loam, undulating phase (2 to 5 percent slopes) (Ca).—This moderately well drained soil of terrace lands has formed from alluvial material, chiefly from limestone origin, but in many places material from sandstone and shale have been mixed with it. The soil has formed under hardwoods. It occurs in small widely separated areas along streams that flow from limestone uplands. It occupies low to high stream terraces and is closely associated with the Huntington, Lindside, and Melvin soils of the bottom lands. The greater part is in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

Profile description:

Surface soil—
0 to 8 inches, brown to dark yellowish-brown friable silt loam; weak fine crumb structure.
8 to 14 inches, yellowish-brown friable silt loam; weak medium granular structure.
Subsoil—
14 to 24 inches, brownish-yellow friable silty clay loam; weak medium blocky structure.
Underlying material—
24 inches +, brownish-yellow friable silty clay or silty clay loam mottled with light gray and reddish yellow; moderate medium blocky structure; contains many black concretions about the size of birdshot; bedrock at depths of 4 to 12 feet.

The surface soil and subsoil vary in thickness. A large part of this undulating phase has been moderately eroded. In the eroded areas the plow layer is made up of a mixture of original surface soil and subsoil material. It consists of dark yellowish-brown to yellowish-brown friable silt loam or heavy silt loam. Erosion has been severe in some small spots, and the plow layer consists mostly of brownish-yellow friable silty clay loam. In a few areas there are occasional shallow gullies.

Capshaw silt loam, undulating phase, is medium to strongly acid throughout and contains a low quantity of organic matter. It has a poor to moderate supply of plant nutrients and high moisture-supplying capacity. Permeability is moderate in the surface soil and moderately slow in the subsoil. The soil is generally free of gravel and chert. Workability is very good.

Use suitability (group 6).—Practically all of this soil has been cleared and is used for crops. Small acreages are in pasture and timber.

The soil is suited to most of the crops commonly grown, but it is not well suited to alfalfa. It is very well suited to corn, cotton, small grains, and most hay crops. It is well suited to pasture, but because of its favorable slopes and good productivity, it is more desirable as cropland.

The soil is not very susceptible to erosion, unless it is used too intensively for row crops. Soil losses can be controlled by a moderately short rotation. Engineering methods of erosion control are generally unnecessary. The soil is deficient in lime for some legumes. Yields of most crops are only fair without fertilization, but if the soil is adequately fertilized, limed, and otherwise well managed, it is highly productive.

Clarksville cherty silt loam, rolling phase (5 to 12 percent slopes) (Ce).—This light-colored, well-drained cherty soil on uplands has formed from material weathered in place from cherty dolomitic limestone. The soil occurs on cherty ridges in close association with Fullerton soils and with other Clarksville soils. Most of it is in the Fullerton-Clarksville-Greendale soil association.

Profile description:

Surface soil—
0 to 8 inches, light-gray loose to friable cherty silt loam; structure, weak fine crumb or single grain.
8 to 20 inches, pale-yellow friable cherty silt loam; weak fine crumb structure.
Subsoil—
20 to 40 inches, brownish-yellow friable cherty silty clay loam or silty clay; moderate fine blocky structure.
Parent material—
40 inches +, mottled reddish-yellow, yellow, and gray firm cherty silty clay; compact in place; moderate fine blocky structure; limestone bedrock at depths of 20 to 40 feet.

In some places the surface soil is cherty loam and the subsoil contains a considerable quantity of sand grains.

The soil is strongly acid and low in organic matter and fertility. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The moisture-supplying capacity is moderate. Because of favorable slopes, workability is fair. The chert fragments, however, interfere somewhat with cultivation and are hard on tillage implements and mowing equipment. Runoff is medium, and the risk of erosion is slight to moderate.

Use suitability (group 11).—This soil is practically all in cutover deciduous forests.

The soil is suited to moderately intensive use, but in comparison to other soils developed over limestone, high fertility is much harder to maintain. Where adequate fertilization is practiced, corn, cotton, small grains, lespedeza, red clover, and redtop are suited. Tobacco and certain truck crops are well suited. The more exacting legumes and grasses, including alfalfa, bluegrass, and whiteclover, are better suited to soils of the Decatur, Dewey, and Farragut series. If good yields of crops are desired, heavy fertilization and additions of lime and organic matter are necessary.

Clarksville cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Cc).—This soil differs from Clarksville cherty silt loam, rolling phase, mainly in being moderately eroded.

The eroded surface soil, about 15 inches thick, consists of pale-yellow friable cherty silt loam. The rest of the profile is similar to that of the uneroded rolling phase. In a small acreage the soil is a cherty loam in texture. A few patches on the more exposed positions have lost all the original surface layer. In these places the plow layer is yellow or reddish-yellow cherty silty clay loam.

The soil is strongly acid and low in organic matter and fertility. Permeability is rapid in the surface soil and moderate in the subsoil. The moisture-supplying capacity is moderate. Chert on the surface and

in the profile interferes with cultivation, and the soil has only fair workability. Runoff is medium, and the risk of further erosion is moderate.

Use suitability (group 11).—This soil is used mostly for crops. It is suited to some hay crops and to tilled crops such as corn, tobacco, and small grains. The more exacting crops, such as alfalfa, bluegrass, and whiteclover, are not so well suited, and good stands are difficult to maintain. With adequate fertilization, however, fairly good yields of the better suited crops can be obtained. Fairly good pasture can be maintained if adequate fertilization is practiced and lespedeza and redtop or other suitable pasture plants are seeded.

Clarksville cherty silt loam, hilly phase (12 to 25 percent slopes) (Cd).—This is a light-colored, somewhat excessively drained cherty soil that formed on uplands from material weathered in place from dolomitic limestone. The soil has formed under hardwoods, chiefly oak and hickory. It is similar to Clarksville cherty silt loam, rolling phase, in color, texture, and structure. It differs chiefly in having stronger slopes, usually slightly thinner profile layers, and generally a shallower depth to limestone bedrock. It occurs in large areas and occupies cherty ridge slopes. It is closely associated with Fullerton soils of the uplands and with Pace and Greendale soils of the colluvial lands. Most of it occurs in the Fullerton-Clarksville-Greendale soil association.

The surface soil is light-gray, loose to friable cherty silt loam in the upper 3 to 8 inches and pale-yellow friable cherty silt loam in the lower 8 to 14 inches. The subsoil, about 18 inches thick, consists of brownish-yellow friable cherty silty clay loam. In some areas the surface soil is friable cherty loam and the subsoil contains a notable quantity of sand grains. In places the subsoil and underlying material are predominantly pale yellow or brownish yellow, but in a few places gray predominates. The quantity and size of the chert fragments in the soil vary. In places the fragments are less than 2 inches across, but in others they are 12 to 16 inches across. Limestone bedrock occurs at depths of 15 to 35 feet.

The soil is strongly acid throughout, low in organic matter and plant nutrients, and moderate to low in moisture-supplying capacity. Permeability is moderately rapid in the surface soil and moderate in the subsoil. Because of chert content and strong slopes, workability of the soil is poor. Runoff is medium, and the soil is moderately to highly erodible.

Use suitability (group 15).—Practically all of this soil is in cutover native deciduous forest. Its chertiness, strong slopes, and low fertility limit its suitability for tilled crops. Fertility is difficult to maintain, and frequent applications of fertilizer and lime, along with careful field operations, are necessary for satisfactory yields of crops. The soil is somewhat droughty for such late-maturing crops as corn; it is better suited to small grains and cotton.

The soil can be made to produce fairly good pasture if it is adequately fertilized and seeded. Stands of the more exacting legumes and grasses, however, are more difficult to maintain on this soil than on soils of higher fertility. For this reason, lespedeza, redtop, and fescue may be better suited.

Clarksville cherty silt loam, eroded hilly phase (12 to 25 percent slopes) (Cb).—This soil has lost a considerable part of its original surface soil through erosion. This soil is on cherty ridge slopes, and much of it is in the Fullerton-Clarksville-Greendale association.

The present surface soil, about 15 inches thick, consists of pale-yellow friable cherty silt loam. The subsoil is about 15 inches of brownish-yellow friable cherty silty clay loam or silty clay. Below this is mottled reddish-yellow, yellow, and gray compact cherty silty clay loam. Dolomitic limestone lies at depths of 15 to 35 feet.

In a small acreage the surface soil is friable cherty loam and the subsoil contains some sand.

Clarksville cherty silt loam, eroded hilly phase, is low in plant nutrients and organic matter. It is strongly acid. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The moisture-supplying capacity of the soil is moderate to low. Runoff is rapid, and the risk of further erosion is high. Workability is poor.

Use suitability (group 15).—Nearly all of this soil has been cleared and cropped at some time. Probably two-thirds of it is now used for pasture or is idle; the rest is used for corn, cotton, and hay, chiefly lespedeza. Some small grain is grown.

Chiefly because of its strong slopes, low fertility, and chert, this soil has limited suitability for tilled crops. Chert in the soil interferes with cultivation, and in a few places almost prohibits it. Fertilizer is applied to only a small extent, and a little lime has been applied. Long rotations, heavy fertilization, and careful tillage are needed for crops. With proper fertilization and liming, the soil can maintain good stands of the less exacting grasses and legumes. The pasture, however, ceases to grow during the drier parts of the growing season. In general the north-facing slopes are less droughty than the south-facing slopes. The most eroded areas are the most droughty.

Clarksville cherty silt loam, steep phase (25 to 60 percent slopes) (C†).—This light-colored excessively drained cherty soil differs from Clarksville cherty silt loam, rolling phase, chiefly in having stronger slopes, a greater quantity of chert, a thinner surface soil, and more excessive drainage. Most of this soil is in the Fullerton-Clarksville-Greendale association.

The surface soil, about 10 inches thick, is light-gray friable cherty silt loam. The subsoil, about 18 inches thick, consists of pale-yellow or brownish-yellow friable cherty silty clay loam. The layer underlying the subsoil is splotched reddish-yellow compact cherty silty clay. Bedrock occurs at depths of 12 to 30 feet. On about 154 acres, the soil has lost a moderate part of its surface soil through erosion.

Clarksville cherty silt loam, steep phase, is low in plant nutrients and organic matter. It is strongly acid. Permeability is moderately rapid in the surface soil and moderate in the subsoil. The moisture-supplying capacity is low. Mainly because of its steep slopes and high chert content, the soil is very difficult to cultivate. It is very susceptible to erosion. Workability is very poor.

Use suitability (group 20).—This soil is nearly all in cutover deciduous forest. Its strong slopes, chert content, and low fertility make it poor for either crops or pasture. It is best used for timber. Where the soil must be used for crops, very careful management, including use of long rotations and fertilizer, is needed.

Colbert silty clay, eroded undulating phase (2 to 5 percent slopes) (Ch).—This is a somewhat poorly drained to moderately well drained plastic soil of the uplands. It has developed under a deciduous forest from material weathered from clayey limestone. Most of the soil has been moderately eroded; it has lost 50 to 75 percent of the original silt loam surface soil. In most places the plow layer consists of a mixture of surface soil and subsoil material. Some shallow gullies have formed in most areas. This soil is associated with Talbott soils and with Stony rolling and hilly land, limestone. Most of its small acreage is in the Sequoia-Talbott-Colbert soil association.

Profile description:

Surface soil (plow layer)—
0 to 6 inches, pale-yellow to brownish-yellow firm silty clay to silty clay loam; weak medium granular structure.

Subsoil—
6 to 12 inches, brownish-yellow to yellowish-brown very firm silty clay or clay; very plastic when wet; weak fine blocky structure; contains hard black concretions.

Parent material—
12 to 20 inches, brownish-yellow to yellowish-brown clay or silty clay mottled with gray and yellowish red; very plastic when wet; massive structure; has many hard black concretions about the size of birdshot; limestone bedrock lies at depths of 1½ to 3 feet.

Because of erosion, the present surface soil varies considerably in color, texture, and thickness. In most areas there are a few outcrops of limestone bedrock. In a total of about 34 acres, where there has been very little or no erosion, the surface soil consists of about 10 inches of brown or yellowish-brown friable silt loam.

The soil is medium to strongly acid throughout, low in organic matter, and medium to low in plant nutrients. The surface soil is slowly permeable, and the subsoil is very slowly permeable. Air, water, and plant roots penetrate the very firm subsoil with difficulty. The moisture-supplying capacity of the soil is low; consequently, crops are subject to injury during drought. Because it is plastic, the workability of the soil is poor when it is too moist. The soil can be worked only within a narrow range of moisture content. It is moderately to highly susceptible to sheet erosion.

Use suitability (group 8).—Practically all of this soil is now used for crops. A small part is in pasture or is idle. Because of the low moisture-supplying capacity and its poor response to fertilizers, yields on this soil are generally low. Yields vary greatly, depending on the quantity and distribution of rainfall.

The soil is suited to crops, but fairly exacting management requirements must be met, particularly those of tillage. The soil is fair for pasture. Fairly good lespedeza, bluegrass, and clover can be grown, but they are subject to injury during drought.

Colbert silty clay, eroded rolling phase (5 to 12 percent slopes) (Cg).—This soil differs from Colbert silty clay, eroded undulating phase, in having stronger slopes and in being more eroded. A few shallow and deep gullies have formed in most areas. Most of this soil is in the Sequoia-Talbott-Colbert soil association.

Most of the original silt loam surface soil has been lost, and tillage is largely in the subsoil. In most places the present plow layer is brownish-yellow or yellowish-brown firm silty clay to silty clay loam. The subsoil, a brownish-yellow or yellowish-brown very firm silty clay or clay, is very plastic when wet and has some gray mottles in places. A few included areas are only slightly eroded, and in these the surface soil is silt loam or heavy silt loam. Outcrops of limestone bedrock are common.

The soil is medium to strongly acid, low in organic matter, and medium to low in plant nutrients. Permeability is slow in the plow layer and very slow in the subsoil. Because of rapid surface runoff and nearness of bedrock to the subsoil, the soil has a low moisture-supplying capacity. The risk of further erosion is high, and workability is poor.

Use suitability (group 14).—Most of this soil has been cleared and used for crops or pasture. A large part is now in unimproved pasture, and a considerable part is idle. Some areas are used for crops, but yields are generally low. Because of poor tilth, low productivity, and droughtiness, this soil is poorly suited to crops. It is not well suited to pasture, but it is better for pasture than for crops.

Conasauga silt loam, undulating phase (2 to 5 percent slopes) (Cm).—This is a somewhat poorly drained, friable, mottled soil of uplands. It has developed from weathered products of acid shale, or interbedded acid shale and sandstone. The largest areas of the soil are in the southern part of the county in the area drained by Coahulla Creek. Smaller, widely separated areas occur in shale valleys throughout the county. The soil is closely associated with the Montevallo and Apison soils.

Profile description:

Surface soil—
0 to 6 inches, light brownish-gray to very pale brown friable silt loam; weak fine granular structure.

Subsoil—
6 to 12 inches, light yellowish-brown friable silt loam; weak medium blocky structure.
12 to 28 inches, mottled light-gray, brownish-yellow, and yellowish-red friable silty clay loam; weak medium blocky structure.

Parent material—
28 inches +, mottled light-gray and brownish-yellow friable heavy silt loam or silty clay splotched with yellowish red; bedrock occurs at depths of 1½ to 3 feet.

The soil is medium to strongly acid, low in organic matter, and medium to low in fertility. Permeability is moderately slow in the surface soil and slow in the subsoil. The moisture-supplying capacity of the soil is low. Workability is good. Runoff is medium, and the risk of erosion is moderate.

Use suitability (group 7).—Most of this soil is in forest, mainly oak and hickory. Many areas that have been cut over a number of times have a high proportion of loblolly and shortleaf pines. In general the timber from the trees is now of low market value.

This soil has limited value for crops or pastures because of its low productivity, somewhat poor drainage, and low moisture-supplying capacity. It is poor for deep-rooted legumes, particularly alfalfa. It is somewhat droughty for late-maturing crops. Even under good management, yields of corn are only fair. The soil is somewhat better for small grains, hay crops, and cotton. It is moderately well suited to pasture if adequately limed and fertilized and otherwise well managed. Pasture yields can be expected to be low during extended dry periods because the soil has a low moisture-supplying capacity.

Conasauga silt loam, eroded undulating phase (2 to 5 percent slopes) (Ck).—This soil is similar to Conasauga silt loam, undulating phase, in most profile characteristics; it differs chiefly in being moderately eroded. Its surface soil therefore varies more in thickness, color, and texture. Erosion has taken about 50 to 75 percent of the original surface soil. A few short shallow gullies have formed in some places. The soil is widely distributed in the shaly parts of the county. It occurs in small areas in association with the Montevallo and Apison soils.

The plow layer consists of pale-yellow to yellowish-brown friable silt loam or heavy silt loam. In the upper 5 inches, the subsoil is light yellowish-brown friable silt loam, and in the lower 16 inches it is mottled light-gray, brownish-yellow, and yellowish-red friable silty clay loam.

This soil is medium to strongly acid, low in organic matter, and medium to low in fertility. Permeability is moderately slow in the plow layer and slow in the subsoil. The moisture-supplying capacity is low. The soil is moderately susceptible to further erosion. It has good workability.

Use suitability (group 7).—All of this soil is used for crops and pasture or is idle. It can be used for crops and pasture, but chiefly because of low productivity, somewhat poor drainage, and low moisture-supplying capacity, its suitability is limited. When limed and fertilized, it is moderately productive of pasture. Even with adequate fertilization, yields of corn are generally low, because the soil is droughty. Small grains, cotton, and lespedeza are successfully grown, but yields are low where fertilization is inadequate. Alfalfa is generally not successful, even under good management. Since the soil is susceptible to further erosion, control of erosion is a necessary part of good management.

Conasauga silt loam, level phase (0 to 2 percent slopes) (Cl).—This is a somewhat poorly drained, mottled, friable soil of the uplands. It has developed from weathered products of acid shale, or stratified acid shale and sandstone. The soil has formed under hardwoods. It occurs in small areas that are widely distributed throughout the shale valleys. It is closely associated with Montevallo and Apison soils on the uplands, and with the Cotaco soils of the colluvial slopes that lie along intermittent drainageways.

Profile description:

Surface soil—
0 to 6 inches, light brownish-gray to very pale brown friable silt loam; weak fine granular structure; in wooded areas the ½ to 1½ inches nearest the surface are stained dark yellowish brown or grayish brown by organic matter.

Subsoil—
6 to 12 inches, pale-yellow to brownish-yellow friable silt loam or heavy silt loam; weak medium blocky structure.
12 to 18 inches, mottled light-gray, brownish-yellow, or pale-yellow friable heavy silt loam or silty clay loam; weak medium blocky structure.

Parent material—
18 to 34 inches, mottled light-gray, brownish-yellow, and yellowish-red friable silty clay loam; plastic when wet; material is predominantly light gray and pale yellow when dry; has weak medium blocky structure.
34 inches +, mottled light-gray and brownish-yellow friable heavy silt loam or silty clay loam with splotches of yellowish red; depth to bedrock ranges from 2 to 3 feet.

The layers of the profile vary somewhat in thickness. The depth to mottling varies from 10 to 16 inches. In some areas a compact pan layer occurs at a depth of about 36 inches.

The soil is medium to strongly acid throughout, low in organic matter, medium to low in plant nutrients, and moderate in moisture-supplying capacity. Permeability is moderately slow in the surface soil and slow in the subsoil. The soil may be partly waterlogged during very wet periods. It is free of gravel, chert, or shale fragments. Workability is good. Control of erosion is a minor problem because the soil is nearly level. A high level of fertility is difficult to achieve and to maintain.

Use suitability (group 7).—A considerable part of this soil is in timber. The cleared land is used for crops and pasture or is idle.

The soil can be used for crops and pasture, but because of its low productivity, somewhat poor drainage, and only moderate moisture-supplying capacity, its suitability for use is only medium. It is poorly suited to alfalfa even if adequately limed, fertilized, and otherwise well managed. Yields of corn are only moderate, because of the medium to low fertility and droughtiness of the soil. The soil is better suited to small grains, lespedeza, and cotton. It is moderately well suited to pasture if properly limed and fertilized and if suitable pasture plants are established.

Cotaco silt loam (0 to 7 percent slopes) (Co).—This soil is somewhat poorly drained. It was derived from local alluvial and colluvial materials that washed from adjacent soils, principally the Litz, Montevallo, Apison, and Sequoia, that are underlain by shale and in places by limestone. This soil occupies nearly level to gently sloping strips along intermittent drainageways and is widely distributed throughout the Litz-Sequoia-Cotaco and Montevallo-Apison-Cotaco soil associations.

Profile description:

Surface soil—
0 to 10 inches, grayish-brown to light grayish-brown friable silt loam; weak fine crumb structure.

Subsurface layer—
10 to 35 inches, mottled brownish-yellow, light yellowish-brown, and gray friable silty clay loam or heavy silt loam.

Underlying material—
35 inches +, alluvium or colluvium composed of material of variable color and texture; bedrock, generally shale, at depths of 2 to 7 feet.

The surface soil varies from 6 to 16 inches in thickness. The depth to the gray mottling varies considerably. In some places the mottling is within 10 inches of the surface. In others it is below 24 inches, and this lower depth indicates better drainage. Some areas have shale fragments throughout the soil. In a few areas the soil consists of young colluvial material washed from Dandridge soils, but the profile in these places is not very much different from the typical profile.

Cotaco silt loam is medium to strongly acid and moderately well supplied with organic matter. It is medium to low in plant nutrients. Permeability is moderate in the surface soil and moderately slow in the subsoil. Its moisture-supplying capacity is very high. In most places the subsoil is saturated much of the time. Runoff is slow to medium but adequate in most places. Temporary flooding occurs after heavy rains in many areas. Workability is good.

Use suitability (group 3).—A large part of this soil has been cleared. The cleared areas are used chiefly for crops and pasture, but some of them are idle. Most of the areas are small and narrow, and they are treated in much the same way as the surrounding areas of more extensive soils.

The soil is well suited to corn, vegetables, and many other annual crops that mature in summer, but it is not so well suited to small grains, tobacco, and alfalfa. It is well suited to pasture, but lime and phosphorus are essential for best yields. Bluegrass, whiteclover, and lespedeza are well suited to areas that have been treated with lime and phosphorus.

Cotaco loam (0 to 7 percent slopes) (Cn).—This is a somewhat poorly drained soil. It was derived from local alluvial and colluvial materials washed from adjacent higher lying sandy soils of the uplands that are underlain principally by sandstone and shale. These materials washed mostly from Montevallo soils and from the Lehew-Montevallo soil complex. This soil occurs in nearly level to gently sloping strips along intermittent drainageways. Most of it is in widely distributed areas in the western part of the county. Its total acreage is only about one-sixth as large as that of Cotaco silt loam. This soil is in the Lehew-Montevallo-Cotaco soil association.

Profile description:

Surface soil—
0 to 8 inches, grayish-brown to light brownish-gray very friable loam; weak fine crumb structure.
Subsurface layer—
8 to 24 inches, mottled gray and brownish-yellow friable loam or sandy clay loam; sticky when wet.
Underlying material—
24 inches +, mottled light-gray and brownish-yellow friable clay loam or sandy clay loam; sticky when wet; bedrock at depths of 2 to 7 feet.

The surface soil ranges from 8 to 15 inches in thickness, and the subsurface layer, from 9 to 18 inches. The texture of the surface soil ranges from loam to fine sandy loam. Some very small areas remain wet, or are very poorly drained. A few areas contain small fragments of sandstone, but these do not prohibit cultivation.

Small areas of Barbourville loam and Barbourville stony loam are included.

Cotaco loam is medium to strongly acid and has a moderate supply of organic matter. Its fertility is medium to low. Permeability is moderate in the surface soil and moderately slow in the subsoil. Surface runoff is slow to medium, and internal drainage is slow. Seepage from the adjacent slopes keeps the lower soil layers saturated much of the time, and moisture is available to plants through a great part of the growing season. The control of erosion is generally not a problem. Workability is very good when the soil is not saturated.

Use suitability (group 3).—Most of this soil is used for crops and pasture. Some areas are idle. Corn and hay are the chief crops. Many areas are farmed with the surrounding soils.

The soil is suited to crops, but lack of good internal drainage limits its suitability. Corn, certain hay crops, and pasture are among the best suited crops, and the relatively moist condition of the subsoil favors their growth. Fertilizers are used sparingly for crops. The soil responds well if properly fertilized. Because it has a smooth surface and responds to adequate fertilization, the soil is well suited to intensive cultivation. In many places it can be improved by artificial drainage.

Cumberland silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Cr).—This is a well-drained soil on high stream terraces. It has developed over old general alluvium. The alluvium was derived from limestone materials, but it contains some material from sandstone, shale, and quartzite. The soil has lost most of its original silt loam surface soil through erosion. The plow layer consists of a mixture of remaining surface soil and subsoil materials.

This soil is associated with the other Cumberland soils and Waynesboro soils. It occurs mainly along the Hiwassee River and Chatata and Candies Creeks. Most of it is in the Cumberland-Etowah-Sequatchie soil association.

Profile description:

Surface soil—
0 to 6 inches, plow layer of dark-brown to reddish-brown friable silty clay loam.
Subsoil—
6 to 32 inches, red or dark-red friable to firm silty clay loam; sticky when wet; moderate medium blocky structure.
Underlying material—
32 to 48 inches, reddish-brown to red friable to firm clay loam; weak medium blocky structure; gravel bed or bedrock at depths of 4 to 20 feet.

The subsoil ranges from 20 to 27 inches in thickness. Areas on the high stream terraces adjacent to the Hiwassee River contain some pebbles and cobblestones, but they do not interfere much with cultivation. On some of the more exposed parts little of the original surface soil is left and the plow layer consists of red firm silty clay loam. A total of about 3 acres of the soil has had little or no erosion. Here, the surface soil is about 8 inches of brown to dark reddish-brown friable silt loam.

This soil is medium to strongly acid. It has a moderate supply of organic matter and medium to high fertility. Permeability is moderate in the plow layer and moderately slow in the subsoil. The moisture-

supplying capacity is moderate to high. Workability is good. Runoff is slow to medium, and erodibility is moderate.

Use suitability (group 4).—All of this soil has been cultivated, and a great part is now used for crops and pasture. Corn, red clover and alfalfa, and small grains occupy much of the acreage.

The soil is well suited to a wide variety of crops, and under proper management it can be used in a 3-year rotation. Tobacco produces well, but the quality of the crop may not be so desirable as on some of the other soils. The soil is especially well suited to the more exacting legumes and grasses.

Cumberland silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Cp).—This soil differs from Cumberland silty clay loam, eroded undulating phase, chiefly in having stronger slopes. In most places the plow layer consists of remnants of the original silt loam surface soil mixed with subsoil material. The soil is widely distributed on high stream terraces in the limestone valleys. Most of it is in the Cumberland-Etowah-Sequatchie soil association.

The plow layer is dark-brown to reddish-brown friable silty clay loam. The subsoil is red or dark-red friable to firm silty clay loam, sticky when wet. It is about 25 inches thick and is underlain by reddish-brown to red friable to firm clay loam. Either a gravel bed or bedrock lies at depths of 3 to 15 feet. Some small areas have been severely eroded and have lost all of their original surface soil through erosion. In these areas the plow layer consists of red or dark-red friable to firm silty clay loam.

A very small uneroded acreage is included. It has a brown to dark reddish-brown friable silt loam surface soil about 7 inches thick.

Cumberland silty clay loam, eroded rolling phase, has medium to high fertility and a moderate content of organic matter. It is medium to strongly acid. Permeability is moderate in the plow layer and moderately slow in the subsoil. The soil has a moderate moisture-supplying capacity. The risk of further erosion is moderate to high, but the control of soil loss is not difficult under good management. Workability is good, but in the small areas that have lost all of their original surface soil by erosion, the moisture conditions and tilth are less favorable for cultivation. The soil is medium to high in productivity.

Use suitability (group 9).—This soil is well suited to cultivation, but its rolling surface makes it somewhat less suitable than Cumberland silty clay loam, eroded undulating phase. It is especially well suited to corn and small grains and to legume-grass mixtures for hay and pasture. Like the other Cumberland soils, this soil is especially well suited to alfalfa, red clover, bluegrass, and whiteclover. It is very well suited to pasture if it is limed and fertilized and desirable pasture plants are established. The soil responds well to the use of lime, fertilizer, and manure, and to other good management practices.

Cumberland silty clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Ct).—This is a red somewhat excessively drained soil. It was derived from old general alluvium that washed from uplands underlain chiefly by limestone. This soil differs from Cumberland silty clay loam, eroded rolling phase, principally in being more eroded. It is associated with other Cumberland soils on high stream terraces.

All or most of the surface soil and, in places, part of the subsoil have been removed by erosion. The present plow layer is red or dark-red firm silty clay loam. The subsoil is red or dark-red friable to firm silty clay loam in approximately the upper half, and reddish-brown to red friable to firm clay loam in the lower half.

The soil is medium to strongly acid. It has a very low content of organic matter and medium to low fertility. Permeability is moderately slow, and moisture-holding capacity is low. The risk of further erosion is high. Surface runoff is medium to rapid; internal drainage is medium. The soil has only fair workability.

Use suitability (group 14).—All of this soil is used for crops and pasture.

Cumberland silty clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Cs).—This is a red somewhat excessively drained soil on high stream terraces. It has developed over old general alluvium that contains a high proportion of limestone materials.

This soil differs from Cumberland silty clay loam, eroded undulating phase, mainly because it occurs on stronger slopes, has a greater degree of erosion, and is more variable in the color and texture of its plow layer. Its small acreage occurs chiefly in small widely separated areas. Most of this soil is in the Cumberland-Etowah-Sequatchie soil association.

The present plow layer consists of red to dark-red firm silty clay loam. The subsoil, about 10 inches thick, is red or dark-red friable to firm silty clay loam. Some rounded waterworn pebbles and a few cobblestones are mixed through the soil. A few shallow and deep gullies have formed in most areas. Nearly half of the acreage is only moderately eroded; these areas have a reddish-brown silty clay loam plow layer.

The soil is medium to strongly acid, very low in organic matter, and medium to low in fertility. It has moderately slow permeability throughout. The moisture-supplying capacity is low, and the soil is somewhat droughty during extended dry periods. It has strong slopes and rapid surface runoff. Workability of the soil is poor.

Use suitability (group 17).—All of this soil has been cleared, and most of it is used for crops or pasture. A small part is idle, and a few areas have been abandoned.

The soil is well suited to pasture if adequately limed and fertilized and if other needed management is practiced. Many different pasture plants can be grown. Alfalfa and other crops also can be grown, but the soil is only fairly well suited to them. Because the soil is erodible, it is poorly suited to intensive row-crop production. It is somewhat droughty for corn or other crops that mature late in the growing season. Small grains and hay crops are better suited.

Dandridge shaly silt loam, hilly phase (12 to 25 percent slopes) (Dd).—This is a light-colored, somewhat excessively drained shallow to deep soil of the uplands. It has developed from material that weathered in place from calcareous shale. Much of this soil is in a

hilly landscape. It is in the Tellico-Alcoa-Neubert soil association.

Profile description:

Surface soil—
0 to 4 inches, light yellowish-brown to brown friable shaly silt loam or heavy shaly silt loam.
Subsurface layer—
4 to 12 inches, brownish-yellow friable heavy shaly silt loam or silty clay loam.
Parent material—
12 inches +, variegated yellowish-brown and pale-yellow partly decomposed shale with which a small quantity of silty soil material is intermixed; total depth to shale bedrock ranges from 1 to 4 feet.

The surface soil ranges from 3 to 6 inches in thickness, and the subsurface layer, from 6 to 10 inches. About half of the acreage overlies black shale and is shallow to bedrock. Elsewhere, the shale is more variegated and the upper part may be leached of lime. The soil over the more variegated shale ranges from shallow to deep.

The soil is slightly acid to alkaline. It is low in organic matter and plant nutrients. Permeability is moderate, and usually water can percolate into the underlying shale at a moderate rate. Because of the nearness of bedrock to the surface, the moisture-holding capacity is limited. Moisture-supplying capacity is low. Surface runoff is rapid, and the risk of erosion is high. The soil has only fair workability.

Use suitability (group 18).—Practically all of this soil is in cutover deciduous forest. The soil is not well suited to tilled crops, chiefly because it is hilly and bedrock is near the surface. It is suited to pasture, and such pasture plants as bluegrass and whiteclover can be grown. The carrying capacity of pasture is limited by the droughtiness of the soil. The herbage ceases growth during the drier parts of the grazing season.

Dandridge shaly silt loam, eroded hilly phase (12 to 25 percent slopes) (Da).—This soil differs from Dandridge silt loam, hilly phase, chiefly in having lost some surface soil through erosion. In some areas erosion has caused gullies 1 to 2 feet deep, and in others it has exposed the shale bedrock. Most of this soil is in the northeastern part of the county. It is in the Tellico-Alcoa-Neubert soil association.

The 4-inch plow layer is pale-yellow friable shaly silt loam. The subsurface layer is brownish-yellow friable shaly silty clay loam. Below depths of ½ to 3 feet is either partly disintegrated shale or bedrock of calcareous shale.

The soil is either slightly acid or calcareous throughout. It is low in organic matter and fertility. Permeability is moderate throughout, but nearness of bedrock to the surface greatly limits the amount of moisture the soil can absorb. Surface runoff is rapid and the moisture-supplying capacity is low. The workability of the soil is poor.

Use suitability (group 18).—Practically all of this soil has been cleared and used for crops. Much is now used as unimproved pasture, and parts are idle. A small part is cropped, chiefly to corn and lespedeza, but to a lesser extent to alfalfa and small grains. Crops usually receive only a small amount of fertilizer.

Strong slopes and low moisture-holding capacity make this soil poor for crops. Because the soil has enough lime, it is suited to the more desirable pasture plants. If properly fertilized and seeded, it produces a good stand of the more desirable legumes and grasses. Such pastures have a fair carrying capacity, but droughtiness of the soil greatly restricts grazing during the drier parts of the pasturing season.

Dandridge shaly silt loam, eroded rolling phase (5 to 12 percent slopes) (Db).—This soil is similar to Dandridge shaly silt loam, hilly phase, in most profile characteristics. It differs in having milder slopes and moderate erosion. A few shallow gullies have formed, but most of them can be filled by deep tillage or by subsoiling. Most of this soil is in the Tellico-Alcoa-Neubert soil association in the northeastern part of the county.

Profile description:

Surface soil (plow layer)—
0 to 5 inches, pale-yellow friable shaly or very shaly silt loam or silty clay loam.
Subsurface layer—
5 to 13 inches, brownish-yellow friable shaly or very shaly silt loam or silty clay loam.
Parent material—
13 inches +, variegated yellowish-brown and pale-yellow partly weathered shale containing some soil material; total depth to shale bedrock ranges from 1 to 3 feet.

In some places the shale is black and calcareous; in others it is variegated and calcareous, but may be leached of lime in the upper part. In a total of about 47 acres, the soil has undergone little or no erosion. In these areas the surface soil consists of light yellowish-brown to dark grayish-brown friable shaly silt loam. In some places the first inch or so is notably darker.

The soil is low in organic matter and plant nutrients. Most of it is either slightly acid or alkaline. It is moderately permeable throughout, but its moisture-supplying capacity is low. Risk of erosion is moderate. Workability is fair.

Use suitability (group 16).—All of this soil has been used for crops or pasture. A large part is now idle. The tendency of the soil to dry out greatly limits its suitability for crops.

The soil is suited to small grains and hay; much of it is well suited to pasture. Bluegrass and whiteclover develop a good stand if the soil is properly fertilized.

Dandridge shaly silt loam, steep phase (25 to 60 percent slopes) (De).—This is a light-colored excessively drained soil that is shallow to bedrock of calcareous shale. It differs from Dandridge shaly silt loam, hilly phase, chiefly in having stronger slopes, a generally shallower depth to bedrock, and more shale fragments in the surface soil. Most of this soil is in the Tellico-Alcoa-Neubert soil association.

The surface soil, about 3 to 6 inches thick, is light yellowish-brown to brown friable shaly silt loam or heavy shaly silt loam. The subsurface layer, about 8 inches thick, is brownish-yellow friable heavy shaly silt loam or silty clay loam. Shale underlies the soil at depths of 1 to 2 feet and outcrops in some places.

The soil is slightly acid to alkaline. It is low in organic matter and fertility. It is moderately per-

meable throughout. The moisture-supplying capacity is low. The risk of erosion is high. Workability is very poor.

Use suitability (group 18).—Practically all of this soil is in cutover deciduous forest. It is poor for crops because of strong slopes, shale fragments, and shallow depth to bedrock. Bluegrass and whiteclover make a good stand if adequately fertilized and properly seeded. The carrying capacity of pasture is limited by the droughtiness of the soil. In general, the north-facing slopes produce more pasture than the south-facing slopes, because they have a more favorable moisture content.

Dandridge shaly silt loam, eroded steep phase (25 to 60 percent slopes) (Dc).—Much soil has been lost from most areas of this eroded steep phase. Most of this soil is in the Tellico-Alcoa-Neubert soil association.

The present plow layer consists of pale-yellow friable very shaly silt loam or silty clay loam. The subsurface layer, a brownish-yellow friable very shaly silt loam or silty clay loam, ranges from 6 to 10 inches in thickness, but the average is about 8 inches. Bedrock of calcareous shale occurs at depths of 1 to 2 feet. Gullies are common, and some of them are too large to be obliterated by tillage.

The soil is slightly acid to alkaline and low in organic matter and fertility. It is moderately permeable and has a low moisture-supplying capacity. The risk of further erosion is very high. Workability is very poor.

Use suitability (group 18).—All of this soil has been cleared and cultivated. Much of it is now either idle or in unimproved pasture. Part has reverted to forest. The soil is poor for crops, because it is strongly sloping and shallow to bedrock. The areas most eroded are not well suited to pasture, but in most places much of the soil could be made moderately productive of the more desirable plants by fertilization and seeding. Before seeding, care should be taken to stabilize the soil in the more severely sheet eroded and gullied patches.

Decatur silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Dg).—This red well-drained soil has formed from material that weathered in place from high-grade limestone. Most of this soil has been eroded to such degree that the plow layer now consists of remnants of the original silt loam surface soil mixed with subsoil material. The soil generally occupies small areas in smooth limestone valleys; most of it is in Chatata Valley north of Climer and in the vicinity of the town of Tasso. It is associated with Decatur silty clay loam, rolling phase, and with soils of the Dewey and Emory series. Its small acreage is mostly in the Dewey-Fullerton-Emory soil association.

Profile description:

Surface soil (plow layer)—
0 to 6 inches, reddish-brown to dark reddish-brown friable silty clay loam; weak fine granular structure.
Subsoil—
6 to 36 inches, red to dark-red friable silty clay, plastic when wet; moderate medium blocky structure.
Parent material—
36 to 60 inches +, red firm to very firm silty clay; moderate medium blocky structure; limestone bedrock at depths of 6 to 18 feet.

The surface soil ranges from 6 to 8 inches in thickness, and the subsoil, from 30 to 40 inches. In the less eroded parts, the surface soil is thicker and is more nearly a silt loam. In small patches erosion has removed all of the original surface soil, and in these the plow layer consists of dark-red firm silty clay. In some places the lower part of the subsoil has yellowish streaks and splotches.

This is one of the more durable soils of the county. It is medium to strongly acid and medium to high in fertility. The content of organic matter is moderate. Permeability is moderate in the plow layer and moderately slow in the subsoil. The moisture-supplying capacity is medium to high. Workability is good. Surface runoff is slow to medium, and the risk of further erosion is moderate. The high clay content of the subsoil makes the soil fairly resistant to the formation of gullies.

Use suitability (group 4).—All of this soil has been cultivated, and a large part is now used for crops. Some areas are used for pasture. Corn, lespedeza, and alfalfa are the chief crops. Small grains, tobacco, and cotton are grown to a small extent. Moderately short rotations are common. Some fertilizer is used, and lime has been applied to much of the acreage.

The soil generally can be used fairly well for continuous cropping. The smooth relief, medium to high fertility, and relatively favorable moisture relations make this one of the most desirable soils for crops and pasture. It is especially well suited to alfalfa, red clover, and orchardgrass.

The soil responds well to fertilization. It requires lime for good stands of the more exacting legumes. Boron is one of the requirements for productive stands of alfalfa. Runoff water requires some control if the soil is cultivated.

Decatur silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Df).—This soil differs from Decatur silty clay loam, eroded undulating phase, chiefly in having stronger slopes and in most places slightly more clay in the plow layer. It has severely eroded patches and generally less depth to bedrock than the eroded undulating phase. Its greatest acreage is in Chatata Valley. This soil is associated with Dewey, Hermitage, and Emory soils, and with Decatur silty clay loam, eroded undulating phase. The areas are generally small, and most of them are in the Dewey-Fullerton-Emory soil association.

The 5-inch plow layer is reddish-brown to dark reddish-brown friable silty clay loam. The subsoil is red or dark-red friable to firm, but crumbly, silty clay, which is plastic when wet. Limestone bedrock is at depths of 4 to 14 feet.

The soil is medium to strongly acid. It is medium to high in fertility. Except for the eroded parts, the soil contains a moderate quantity of organic matter. The silty clay subsoil somewhat slows permeability, but plant roots develop normally. The moisture-supplying capacity is moderate. This soil is somewhat more droughty than Emory silt loam, so plant growth is restricted sooner during dry periods. Workability is good. The soil is moderately to highly susceptible to

further erosion, largely sheet erosion. The soil is not very susceptible to gullying.

Use suitability (group 9).—All of this soil is used for crops or pasture. Corn, alfalfa, red clover, and small grains are the principal crops. The soil is particularly well suited to alfalfa, red clover, and the other more exacting pasture plants. Although it is highly productive, the soil responds well to fertilizer and retains its fertility well. Liming is needed for alfalfa. The soil is not well suited to intensive use for row crops, because it is susceptible to erosion. Moderately long rotations are needed to control soil losses. The soil is not so well suited to truck crops as some of the coarser textured well-drained soils.

Dewey silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Dk).—This well-drained, red soil of the uplands has formed from material that weathered from high-grade limestone. It has lost a considerable part of its original silt loam surface soil through erosion. This soil differs from Decatur silty clay loam, eroded undulating phase, in having a dark-brown surface soil and a lighter red and generally more friable subsoil. Compared with the Fullerton soils, it has a browner surface soil and a redder and less cherty subsoil. Most of it lies on gently rounded crests of low ridges in the limestone valleys. It is widely distributed throughout the Dewey-Fullerton-Emory soil association.

Profile description:

Surface soil (plow layer)—
0 to 6 inches, dark-brown friable silt loam or silty clay loam; weak fine granular structure.

Subsoil—
6 to 40 inches, yellowish-red to red friable to firm silty clay loam; with depth, gradual transition to silty clay; weak to moderate medium blocky structure.

Parent material—
40 inches +, yellowish-red to red firm silty clay or silty clay loam containing yellow streaks and splotches; limestone bedrock lies at depths of 8 to 20 feet.

The surface soil ranges from 6 to 8 inches in thickness. On the more exposed knobs are a few patches where all of the original surface soil has been lost through erosion. There the plow layer is red firm silty clay loam or silty clay, and the subsoil ranges from 30 to 40 inches in thickness. A few fine chert fragments are generally present in the lower part of the subsoil.

Dewey silty clay loam, eroded undulating phase, is medium to strongly acid. It has medium to high fertility and contains a moderate amount of organic matter. The plow layer absorbs moisture well, but the moderately slow permeability of the subsoil retards percolation. The moisture-supplying capacity is moderate to high, but less than that of the Emory, Staser, and Huntington soils. Workability is very good. Runoff is slow to medium, and the risk of further erosion is moderate.

Use suitability (group 4).—Practically all of this soil has been cropped. It is now used chiefly for corn, small grains, and hay. It is one of the more desirable soils of the county for general farming. It responds well to fertilization. Rotations of moderate length are used, and some fertilization is practiced. Lime has been applied to much of the acreage.

The soil is well suited to almost all the crops commonly grown. The more exacting legumes and grasses, including alfalfa, red clover, white clover, and bluegrass, are not difficult to establish. If fertility is kept high, yields from crops and pasture are high. This soil is also well suited to tobacco, cotton, and several of the truck crops.

Dewey silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Dh).—This soil differs from Dewey silty clay loam, eroded undulating phase, chiefly in having stronger slopes, in having lost more of its original surface soil through erosion, and in having a greater number of severely eroded patches where more of the clayey subsoil is exposed. This soil is associated with Fullerton, Decatur, and Emory soils, and with other Dewey soils. Most of it is in the Dewey-Fullerton-Emory soil association.

The plow layer normally is a dark-brown friable silty clay loam. The subsoil, 26 to 34 inches thick, is yellowish-red to red, friable to firm silty clay loam in the upper part and silty clay in the lower. Some small chert fragments occur throughout the soil, and especially in the lower part of the subsoil. Limestone bedrock is at depths of 7 to 18 feet.

This soil is medium to strongly acid, medium to high in fertility, and moderate in content of organic matter. The surface soil absorbs moisture well, but the subsoil retards percolation of water. Runoff therefore develops more quickly than on more friable, permeable soils. Except in the more eroded places, the moisture-holding capacity is moderate. Surface runoff is medium. In cultivated areas the risk of further erosion is medium to high. A few small gullies may form in places, but normally they are easy to fill by deep tillage. Workability of the soil is good.

Use suitability (group 9).—Almost all of this soil has been cleared and cropped at some time, and most of it is now used for crops. A considerable acreage is used for pasture. Corn and hay, chiefly lespedeza and alfalfa, are the main crops. Tobacco is a minor crop. Some fertilization is practiced, and much of the soil has been limed.

The soil is well suited to general farming, but its moderately strong slopes require use of fairly long crop rotations. The soil is erodible and therefore especially well suited to a system of farming that keeps the more desirable legumes and grasses on the soil much of the time. If properly fertilized and limed, good stands of alfalfa, red clover, timothy, white clover, and bluegrass are not difficult to establish, and yields should be high. The soil is not well suited to intensive production of row crops.

Dewey silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Dl).—This soil differs from Dewey silty clay loam, eroded undulating phase, chiefly in having stronger slopes and in having lost much of its original surface soil through erosion. The small areas of this soil occur throughout the Dewey-Fullerton-Emory soil association.

The plow layer consists of reddish-brown, friable to firm silty clay, which is plastic when wet. The subsoil, 20 to 24 inches thick, is yellowish-red to red firm silty clay. Beneath the subsoil is a lighter red, friable to firm silty clay that contains some small chert frag-

ments. Limestone bedrock lies at depths of 5 to 16 feet.

As mapped, this soil includes about 21 acres which differ from it by being redder throughout the profile. The included soil has the same suitability for use as this soil.

Dewey silty clay, severely eroded rolling phase, is medium to strongly acid, very low in organic matter, and medium to low in fertility. It absorbs moisture slowly, and its moisture-supplying capacity is low. The strong slopes and moderately slow permeability to moisture cause runoff to develop quickly. Small gullies have formed in some places, but most of them can be filled by deep tillage. The risk of further erosion is moderate to high. The silty clay plow layer has unfavorable tilth, largely because of its clayey texture, and the soil can be worked only within a narrow range of moisture content. Workability is only fair.

Use suitability (group 14).—All of this soil has been cleared and used for crops at some time. Much of it is now idle or in pasture. Some areas are used for crops, chiefly small grains, corn, and hay. In places the soil receives fertilizer, and much of it has been limed.

The suitability of the soil for crops and pasture is limited by its poor tilth, risk of further erosion, and unfavorable moisture relations. The soil will be fairly productive of close-growing crops and pasture if it is correctly fertilized, organic matter is added, and other management is good.

Alfalfa and other deep-rooted legumes are well suited if the fertility of the soil is brought to a moderately high level. Much of the soil can well be used for permanent pasture. The close-growing sod protects the soil and produces pasture of high quality. The soil is somewhat droughty, particularly for plants of high quality that mature during the dry weather that normally comes late in summer or early in fall. Stock grazed on this soil will need supplemental feed or will have to be grazed part of the time on soils having a better moisture supply.

Dowellton silty clay loam (2 to 5 percent slopes) (Dm).—This is a light-colored, poorly drained, shallow to moderately deep soil that has formed in material weathered from clayey limestone. It is on nearly level to undulating areas that were covered with deciduous forest. The areas, small and widely separated, generally occur in shale valleys where the underlying limestone is near the surface. The largest area lies about 2 miles east of Cleveland. In some places the soil is closely associated with the Colbert, Conasauga, and Mullins soils.

Profile description:

Surface soil—
0 to 5 inches, pale-brown friable silt loam to silty clay loam; weak medium granular structure; many hard black concretions about the size of buckshot.

Subsoil—
5 to 30 inches, mottled light-gray and brownish-yellow very firm silty clay; very plastic when wet; massive structure; many hard black concretions; bedrock at depths of 18 to 30 inches.

The surface soil ranges from 4 to 8 inches in thickness, and the subsoil, from 12 to 30 inches. Outcrops of bedrock occur, and in some places they interfere with tillage. In a small total area the soil is rolling (5 to 12 percent slopes).

Dowellton silty clay loam is slightly to strongly acid. It is low in organic matter and is deficient in most of the common plant nutrients. Permeability in both the surface soil and the subsoil is very low.

Because permeability of the subsoil is very slow and bedrock is near to the surface, the moisture-holding and moisture-supplying capacities are low. Runoff is very slow to medium, and the risk of erosion is slight to moderate. The soil has poor workability. It does not respond well to fertilization.

Use suitability (group 19).—About 50 percent of this soil is in forest; the rest is mostly in pasture. A small part is cultivated, but yields are low and crop failures common. Most of the pasture is unimproved and contains pines, scattered cedars, and considerable broomsedge. This soil is poor for cultivated crops. It is also poor for pasture, but pasture is its best use.

Emory silt loam (0 to 5 percent slopes) (Ea).—This is a well-drained very friable soil of the colluvial lands. It was derived from local alluvium and colluvium that washed from soils developed over high-grade limestone. It is associated chiefly with soils of the Hermitage, Sequoia, Decatur, Dewey, and Farragut series and to a lesser extent with soils of the Fullerton series. Most of it is in the Dewey-Fullerton-Emory and the Sequoia-Farragut-Hermitage associations. The soil occurs principally in small strips along intermittent drainageways and as fans where these drainageways join the larger valleys. The soil is nearly level to sloping.

Profile description:

Surface soil—
0 to 18 inches, dark-brown to dark reddish-brown very friable silt loam; weak medium crumb structure.

Subsurface layer—
18 to 38 inches, dark reddish-brown or reddish-brown friable silt loam or silty clay loam; weak fine blocky structure.

Underlying material—
38 inches +, yellowish-red friable silty clay loam; weak fine blocky structure; material may easily be crushed into fine granules; limestone bedrock underlies the soil at depths of 3 to 10 feet.

The surface soil ranges from 10 to 24 inches in thickness, and the subsurface layer, from 10 to 20 inches. Below a depth of about 28 inches, the soil in some places has some gray and brown mottlings, particularly in the areas lying next to the drainage channel. The color of the soil varies, according to the color of the soil material from which it was derived. Material from the Decatur, Dewey, and Farragut soils of the upland tends to impart a reddish color. Where this soil is associated with them, it is dark reddish brown. Dark-brown or lighter soil colors predominate where the soil is associated with Sequoia or Fullerton soils.

This is one of the most productive soils in the county. It is highly fertile, medium to strongly acid, and moderately high in organic matter. Its moisture relations are exceptionally favorable. Permeability is moderate throughout. The moisture-supplying capacity is very high. The soil has excellent workability. The risk of erosion is slight, but in some of the more sloping parts it is moderate.

Use suitability (group 3).—Nearly all of this soil has been cleared and is now cultivated. It is used intensively. Corn, cotton, small grains, and hay crops occupy a great part of its acreage. Little of it is in pasture. Fertilization is practiced, and lime has been applied to much of the soil. High fertility, smooth surface relief, good tilth, and favorable moisture relations make this soil well suited to intensive use. Under proper management, including adequate fertilization, much of it can be used in a short rotation. The soil is well suited to practically all the crops commonly grown. Observations and experience, however, indicate that good stands of alfalfa cannot be made to last as long as on Decatur and Dewey soils. The moisture relations of the soil are favorable to pasture. During the drier parts of the grazing season pasture plants keep growing longer on this soil than on many of the others.

Etowah silt loam, undulating phase (2 to 5 percent slopes) (Ed).—This is a well-drained soil on high stream terraces that extend about 20 to 100 feet above the adjacent first bottoms. The parent material consists of old general alluvium that was derived from uplands underlain mainly by limestone. This soil occurs mainly in small areas, most of them in the Cumberland-Etowah-Sequatchie and Talbott-Colbert-Stony land soil associations. It occupies strips of terrace land along some of the larger creeks, especially Chatata and Sugar Creeks and along the Hiwassee River. Some areas appear not to be associated with the present drainage system.

Profile description:

Surface soil—
0 to 10 inches, dark-brown to reddish-brown friable silt loam; weak fine crumb structure.

Subsoil—
10 to 18 inches, reddish-brown friable heavy silt loam to silty clay loam; weak medium blocky structure.
18 to 40 inches, yellowish-red to red friable silty clay loam; moderate medium blocky structure.

Underlying material—
40 to 50 inches +, yellowish-red, mottled with yellow and gray, friable silty clay loam; moderate medium blocky structure; depth to bedrock ranges from 4 to 20 feet.

The surface soil ranges from 8 to 12 inches in thickness, but in some of the more sloping parts it may be considerably less. In some areas the surface soil is loam, rather than silt loam. Most of these areas are in the vicinity of uplands that are underlain by sandy rock. In a few places shale underlies the soil at a depth of about 5 feet. Soft dark-colored concretions occur below a depth of about 40 inches in most places, and rounded pebbles and cobblestones are mixed throughout the soil. In some areas along the Hiwassee River there is a noticeable quantity of mica flakes throughout the soil.

This is a medium to strongly acid soil. It is moderately permeable throughout and has high moisture-holding and moisture-supplying capacities. Runoff is slow to medium, and the risk of erosion is slight to moderate. Tilth is favorable. The soil has excellent workability.

Use suitability (group 4).—Nearly all of this soil has been cleared and cropped, and most of it is now used for corn, small grains, and hay, chiefly lespedeza and alfalfa. It is one of the more desirable soils of the county for crops and pasture. The soil responds well to fertilizer. Some fertilization is practiced, and lime has been applied to a great part of the soil. Application of lime is necessary for establishing alfalfa.

The soil is productive and suitable for many kinds of crops, including alfalfa and many truck crops. During the drier parts of the growing season, the favorable moisture relations make it especially suitable for crops.

Etowah silt loam, eroded undulating phase (2 to 5 percent slopes) (Ec).—This soil is moderately eroded; otherwise it is similar to Etowah silt loam, undulating phase. The plow layer varies in color and in texture, because part of the surface soil and, in places, part of the subsoil have been lost. The largest acreage of this soil is on high stream terraces along the Hiwassee River. This soil is associated with soils of the Cumberland, Waynesboro, and Sequatchie series, on stream terraces, and with other soils of the limestone uplands. Most of it is in the Cumberland-Etowah-Sequatchie and the Talbott-Colbert-Stony land soil associations.

The present plow layer is a dark-brown to reddish-brown friable silt loam or heavy silt loam. In the few small areas where all of the surface soil has been lost through erosion, the plow layer is yellowish-red to reddish-yellow friable silty clay loam. There are a few shallow gullies, but most of them can be filled by tillage.

A few small areas are included that have a loam texture in the plow layer.

Etowah silt loam, eroded undulating phase, is medium to strongly acid. It is medium to high in fertility and has a moderate content of organic matter. Permeability is moderate throughout. The moisture-supplying capacity of this productive soil is high. Workability is very good.

Use suitability (group 4).—All of this soil has been cleared. Most of it is cultivated and used for general farm crops. A small acreage is idle.

This soil is suited to alfalfa, many market vegetables, and many other crops. Though well suited to pasture, it ordinarily is not used for that purpose, because it is good cropland.

Etowah silt loam, eroded rolling phase (5 to 12 percent slopes) (Eb).—This soil differs from Etowah silt loam, undulating phase, chiefly in having stronger slopes and in having lost more surface soil through erosion. The plow layer consists of remnants of the original surface soil that have been mixed with subsoil material. Most of the soil is in the Cumberland-Etowah-Sequatchie and the Talbott-Colbert-Stony land soil associations.

The present plow layer is dark-brown to reddish-brown friable silt loam or heavy silt loam. In the upper 4 to 8 inches, the subsoil consists of reddish-brown friable heavy silt loam or silty clay loam, and in the lower 20 inches, it consists of yellowish-red to red friable silty clay loam. The underlying material is similar to that of Etowah silt loam, undulating phase. Bedrock occurs at depths of 3 to 15 feet.

In a total of about 71 acres, nearly all or all the

original surface soil and, in places some of the subsoil, has been removed through erosion. The plow layer in these areas is brown friable heavy silt loam or brown, yellowish-red, or red friable silty clay loam. Many shallow and a few deep gullies occur. In the severely eroded areas, the soil tends to be more susceptible to gullying than Decatur soils or other soils with less friable subsoils.

In a total of about 5 acres, there has been little or no erosion. In these areas the surface soil, about 8 inches thick, is dark-brown to reddish-brown friable silt loam.

Etowah silt loam, eroded rolling phase, is medium to strongly acid. It has a moderate content of organic matter and medium to high fertility. Permeability is moderate throughout. The soil has a moderate moisture-supplying capacity. Because of erosion, runoff accumulates more rapidly than on Etowah silt loam, undulating phase, and the risk of further erosion is moderate to high. Workability of the soil is good.

Use suitability (group 9).—Practically all of this soil has been cleared and cropped, and most of it is now used for corn, small grains, and hay.

This soil is suitable for crops, but its slopes are such that at least moderately long rotations are needed to control erosion. The soil responds well to fertilizer. Some fertilization is practiced, and much of the soil has been limed. The more exacting legumes and grasses develop a good stand of pasture if they are adequately fertilized and limed.

Farragut silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Fc).—This is a well-drained soil that has developed from material weathered from interbedded limestone and shale. Limestone has contributed most of the material. The soil now overlies shale, but the shale has contributed little to its formation. This soil closely resembles Decatur silty clay loam, eroded undulating phase, especially in nature of the surface soil and subsoil. The original surface soil was a silt loam, but the texture of the present surface soil varies according to the amount of material lost through erosion. In most areas the plow layer is a mixture of surface soil and subsoil material. This soil occurs in large and small areas and is associated with Sequoia soils in the Sequoia-Farragut-Hermitage soil association.

Profile description:

Surface soil—
0 to 6 inches, dark-brown or dark reddish-brown friable silty clay loam; weak medium crumb structure.
Subsoil—
6 to 22 inches, reddish-brown to red firm silty clay loam; weak medium blocky structure.
22 to 34 inches, yellowish-red to red firm silty clay; plastic when wet; moderate medium blocky structure; larger blocks can be crushed into moderate medium granules.
Parent material—
34 inches +, splotched reddish-yellow and yellowish-red firm silty clay; plastic when wet; shale bedrock is at depths of 3 to 12 feet.

The surface soil ranges from 5 to 8 inches in thickness, and the subsoil, from 18 to 33 inches. In a few patches all the original surface soil has been lost through erosion, and the plow layer is composed of yellowish-red to red firm silty clay subsoil material. On about 7 acres there has been little or no erosion and the surface soil is a friable dark-brown silt loam.

Farragut silty clay loam, eroded undulating phase, is medium to strongly acid. It contains a moderate supply of organic matter and is medium to high in fertility. Permeability is moderate in the surface soil and slow in the subsoil. The moisture-supplying capacity is moderate to high. Surface runoff is slow to medium, and the risk of further erosion is moderate. Tilth is moderately favorable. The silty clay loam surface soil makes tillage for this soil more difficult than for the soils that have a silt loam surface soil. The surface soil puddles more easily, and it clods when plowed under unfavorable moisture conditions. Nevertheless, the soil has good workability.

Use suitability (group 4).—Nearly all of this soil has been cleared and cropped, and most of it is now used for corn, small grain, lespedeza, and alfalfa. A small part is in pasture, and little is idle. The ordinary fertilizers are applied in moderate quantities, and lime has been added to a large part of the acreage.

The soil is well suited to small grains, legume-grass hay, corn, and other general farm crops. It is also well suited to pasture. If properly managed, it is suited to a 3- or 4-year crop rotation. Because the soil is moderately susceptible to erosion, control of runoff is especially important. The more exacting legumes, including alfalfa, are well suited. On most of the acreage it is not difficult to maintain a productive legume-grass mixture.

Farragut silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Fb).—This soil differs from Farragut silty clay loam, eroded undulating phase, chiefly in having stronger slopes and in having lost more soil through erosion. Much of the plow layer consists of original surface soil mixed with subsoil material. The soil occurs in large and small areas. It is associated with Sequoia, Hermitage, and Emory soils. Most of it is in the Sequoia-Farragut-Hermitage soil association.

The plow layer consists of a dark-brown to reddish-brown friable silty clay loam. The upper 10 to 16 inches of the subsoil is reddish-brown to red firm silty clay loam, and the lower 8 to 14 inches is yellowish-red to red firm silty clay. The subsoil is plastic when wet. The material below the subsoil is predominantly yellowish-red firm silty clay. Bedrock of acid shale lies at depths of 2½ to 10 feet. Much of the soil is severely eroded, and in the eroded areas the plow layer consists mostly of reddish firm silty clay subsoil material.

Farragut silty clay loam, eroded rolling phase, is medium to strongly acid and contains a moderate quantity of organic matter. It has medium to high fertility, and it responds well to proper fertilization. The moisture-supplying capacity is normally moderate, but the soil tends to be droughty. Permeability is moderate in the surface soil and slow in the subsoil. The risk of further erosion ranges from moderate to high. Tilth is not good, especially in the more severely eroded areas. The soil has only fair workability. Its productivity is medium to high; yields range

Figure 3.—**Pasture, mainly alfalfa, on Farragut silty clay loam, eroded rolling phase.**

widely according to the quantity of soil material that has been lost through erosion.

Use suitability (group 9).—All this soil has been cleared and cropped. Much of the soil is used for corn, wheat, lespedeza, and alfalfa (fig. 3). A small part is in pasture, and a smaller part is idle.

The soil is suited to crops and pasture, but because of strong slopes, slow subsoil permeability, and somewhat unfavorable tilth, it should not be used so intensively as the smoother more permeable soils. It is capable of producing well if used for a long rotation consisting chiefly of small grains, legume-grass hay, and pasture. Moderately heavy fertilization, adequate liming, and a proper supply of organic matter are needed to keep the soil productive.

Farragut silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Fa).—This somewhat excessively drained soil differs from Farragut silty clay loam, eroded undulating phase, in having stronger slopes and in being more eroded. Practically all, or all, of the original surface soil and, in places, part of the subsoil have been lost through erosion. The present plow layer consists almost entirely of subsoil material. The soil occurs chiefly in association with Sequoia, Hermitage, and Emory soils and with other Farragut soils. Most of it is in the shale valleys in the Sequoia-Farragut-Hermitage soil association.

The present plow layer consists of reddish-brown to red firm silty clay, which is plastic when wet. The subsoil, 13 to 25 inches thick, is yellowish-red to red firm silty clay. Below this, in many places, is splotched reddish-yellow and yellowish-red firm silty clay. Bedrock occurs at depths of 1½ to 9 feet. In most areas many shallow and a few deep gullies have formed.

The soil is medium to strongly acid, very low in organic matter, and medium to low in fertility. Permeability is slow throughout, and the moisture-supplying capacity is low. Because of its poor moisture relations, the soil is low in productivity. It has only fair workability and can be cultivated only within a narrow range of moisture content. It is highly erodible.

Use suitability (group 14).—This soil has all been cleared. It is used to some extent for crops and pasture, but much of it is idle. Because of low productivity, droughtiness, and only fair workability, this soil is poor for crops and only fair for pasture. It can be used for row crops only in a long rotation consisting chiefly of close-growing crops. Fair pasture can be obtained by heavy fertilization, liming, and manuring, but the grazing periods will be fairly short because the soil is droughty. The control of runoff is a major problem in management.

Fullerton silt loam, rolling phase (5 to 12 percent slopes) (Fu).—This is a well-drained soil on cherty ridges. It has developed under hardwoods from material weathered in place from dolomitic limestone. It is chiefly associated with hilly Fullerton soils. The soil is widely distributed in the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil association.

Profile description:

Surface soil—
0 to 8 inches, grayish-brown to brown friable silt loam; weak fine crumb structure.

Subsoil—
8 to 16 inches, reddish-yellow or yellowish-red friable silty clay loam; weak medium blocky structure.
16 to 36 inches, yellowish-red or red firm silty clay; plastic when wet; moderate medium blocky structure.

Parent material—
36 inches +, variegated yellowish-red, reddish-yellow, and yellow friable silty clay; very plastic when wet; bedrock of dolomitic limestone lies at depths of 16 to 40 feet.

The layers of the profile vary considerably in thickness. In some areas below a depth of about 3 feet, the soil material is a fairly tight silty clay. Some chert fragments occur throughout the profile, but they do not materially interfere with cultivation.

The soil is medium to strongly acid. It is low in organic matter and fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil. Runoff is medium. The moisture-supplying capacity is moderate. Workability is good.

Use suitability (group 10).—Much of this soil is in cutover deciduous forest. If cleared for cultivation, the soil would be well suited to tobacco, cotton, market vegetables, and most other crops commonly grown. A high level of productivity is more difficult to maintain on this soil than on soils of the Decatur and Dewey series. Heavy fertilization and liming are needed. The more desirable legumes and grasses will grow on this soil, but they are not so easily established and maintained as on soils of higher fertility. Because it has favorable tilth and moisture relations, this is one of the more desirable soils for truck crops.

Fullerton silt loam, eroded rolling phase (5 to 12 percent slopes) (Fs).—This soil has lost part of its surface soil through erosion. Much of it lies on ridge crests in hilly landscapes. It is widely distributed in the Dewey-Fullerton-Emory and Fullerton-Clarksville-Greendale soil associations.

In most places, the plow layer, a grayish-brown to brown friable silt loam, is a mixture of surface soil and subsoil material. In the more eroded spots, it is a yellowish-red friable heavy silt loam or silty clay loam. Except for the surface layer, the profile resembles that of Fullerton silt loam, rolling phase. Bedrock lies at depths of 16 to 40 feet. Some chert occurs throughout most of the soil, but it does not interfere materially with cultivation.

The soil is medium to strongly acid and low in organic matter and fertility. The surface soil is moderately permeable, but the subsoil is sufficiently compact to retard percolation of water. The moisture-supplying capacity is moderate, and workability is good. Erosion is moderate.

Use suitability (group 10).—All of this soil has been cleared and cropped. Much of it is now used for corn, small grains, hay, and other field crops. About one-third of it is used for unimproved pasture. A small part is idle.

The soil is suited to pasture and many kinds of crops. Most crops are fertilized, and lime has been applied to much of the soil. It is less fertile than the Decatur soils, but it responds if it is properly fertilized and otherwise well managed. The more exacting legumes and grasses yield fairly well under good management, but stands of these crops are more difficult to maintain than on many of the soils of higher fertility. Generally, rotations of moderate length are suitable, but care must be taken to control runoff. Erosion control is one of the problems of soil management.

Fullerton silt loam, eroded undulating phase (2 to 5 percent slopes) (Ft).—This soil differs from Fullerton silt loam, rolling phase, in having milder slopes and in having lost some surface soil through erosion. It occurs in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil association.

In many places the subsoil and parent material are red down to bedrock, which lies at depths of 16 to 40 feet. In a total of about 13 acres, there has been little or no erosion.

Fullerton silt loam, eroded undulating phase, is medium to strongly acid. It is low in organic matter and fertility. Permeability is moderate in the surface soil, or plow layer, and moderately slow in the subsoil. The soil has a moderate moisture-supplying capacity. It has very good workability.

Use suitability (group 5).—Most of this soil has been cleared and cropped, but some is still under cutover deciduous forest. General crops, mainly corn, small grains, and hay, predominate. The rest of the cleared land is chiefly in pasture, but a small part is idle. Some fertilization is practiced, and much of the acreage now cropped or pastured has been limed.

The soil is well suited to tobacco, cotton, market vegetables, and many other crops. For high yields it needs to be heavily fertilized. Under good management it is suited to a moderately short rotation. The more exacting legumes and grasses can be grown but are not so easily established and maintained as on the more fertile Decatur and Dewey soils. The permeable, friable surface soil and smooth slopes make this one of the more desirable soils for strawberries or potatoes, beans, and other row crops.

Fullerton silt loam, eroded hilly phase (12 to 25 percent slopes) (Fr).—This well-drained to somewhat excessively drained soil of the uplands has been moderately eroded. Generally the small separate areas are on ridge slopes, where they adjoin the smoother Fullerton, Clarksville, and Bolton soils that are on the ridge crests. This soil is widely distributed throughout the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale associations.

In most places the plow layer is a grayish-brown friable silt loam consisting of remnants of the original surface soil mixed with subsoil material. The layers below are similar to those of Fullerton silt loam, rolling phase. Bedrock limestone is at depths ranging from 10 to 25 feet. Some patches on the more exposed parts of the slopes have lost practically all of the surface soil through erosion. In these patches the plow layer consists of firm silty clay loam or silty clay subsoil material. There are occasional shallow and a few deep gullies.

This soil is medium to strongly acid. It is low in plant nutrients and organic matter. Moisture infiltrates moderately well. The moisture-supplying capacity is moderate. Runoff is rapid. The risk of further erosion is moderate to high, and the control of soil losses is fairly difficult. The soil has fairly good tilth, but its workability is only fair.

Use suitability (group 15).—All of this soil has been cleared and cropped. Much of it is in unimproved pasture or idle. The rest is cropped, chiefly to corn, cotton, and hay. Lespedeza is the most common hay crop. Little fertilizer is used, but some areas have been limed. The soil can be used for tilled crops, but moderately long rotations consisting mainly of small grains and hay crops should be used. Good stands of the more exacting legumes and grasses can be established, but they require heavy fertilization. Also, the stand is more difficult to maintain for long periods than it is on soils of the Decatur, Dewey, and Emory series. On farms that have enough acreage of soils better suited to tilled crops, much of this soil can well be used for permanent pasture.

Fullerton silty clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Fw). This somewhat excessively drained soil of the uplands has formed on material weathered from dolomitic limestone. It has lost all or practically all its original surface soil through erosion. Most of this soil is in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

The clayey plow layer consists mostly of reddish-yellow to red firm silty clay loam or silty clay subsoil material. The rest of the profile is similar to that of Fullerton silt loam, rolling phase. Bedrock limestone is at depths of 15 to 35 feet.

This soil is medium to strongly acid, low in fertility, and very low in organic matter. It has moderately slow permeability. The moisture-supplying capacity is low. The soil tends to be droughty. Runoff is medium to rapid, and the risk of further erosion is high. Workability is fair.

Use suitability (group 14).—All areas of this soil have been cultivated at some time. Some are now idle or used as unimproved pasture. A small part is cropped along with areas of more productive soils. The clayey plow layer puddles or bakes easily if cultivated when too moist. Because of unfavorable moisture relations and poor tilth, this soil is poor for tilled crops. If properly fertilized and seeded, the soil is capable of supporting fair pasture. Low moisture-

supplying capacity reduces the period during which pasture plants will grow and limits the grazing period to the more moist parts of the growing season.

Fullerton silty clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Fv).—This is an excessively drained soil on cherty ridges. Erosion has removed all or practically all of the original silt loam surface soil and, in places, part of the subsoil. This soil is associated with the other Fullerton soils and with other soils of the cherty ridges.

The plow layer consists mostly of reddish-yellow to red friable to firm silty clay subsoil material. The subsoil, about 18 inches thick, is yellowish-red or red firm silty clay. Bedrock of dolomitic limestone lies at depths of 10 to 25 feet. Gullies are common in places, but most of them can be filled by deep tillage or other methods. After the gullies have been filled, the areas will need special care so that plants will grow vigorously enough to stabilize the soil.

This soil is medium to strongly acid. Fertility is low, and the content of organic matter is very low. Permeability of the soil is moderately low throughout. The soil has a low moisture-supplying capacity and it is decidedly droughty. Moisture infiltrates very slowly, and runoff is rapid. Soil losses are hard to control. Workability is also poor.

Use suitability (group 17).—All of this soil has been cropped at some time. Much of it is now either idle or in unimproved pasture. Part is cropped, chiefly to corn and hay. Tilth is very poor, chiefly because of the high content of clay in the plow layer. Strong slopes, unfavorable tilth, and droughtiness make the soil poor for tilled crops. With proper fertilization and careful seeding, the soil is capable of producing desirable pasture. Pasture of good quality is more difficult to maintain than on the more productive soils, and the droughtiness greatly limits the periods during which the plants will grow.

Fullerton cherty silt loam, rolling phase (5 to 12 percent slopes) (Fh).—This is a well-drained soil of the uplands. It has developed from material weathered from cherty dolomitic limestone. It differs from Fullerton silt loam, rolling phase, chiefly in having chert that interferes materially with cultivation. It occupies fairly extensive tracts on the crests of cherty ridges and is distributed throughout the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations.

Profile description:

Surface soil—
0 to 8 inches, grayish-brown friable cherty silt loam.
Subsoil—
8 to 16 inches, reddish-yellow or yellowish-red friable cherty silty clay loam; weak medium blocky structure.
16 to 36 inches, yellowish-red or red firm cherty silty clay, plastic when wet; moderate medium blocky structure.
Parent material—
36 inches +, variegated yellowish-red, reddish-yellow, and yellow friable cherty silty clay; limestone bedrock at depths of 16 to 40 feet.

The parent material, in some areas, is red instead of variegated. In a few places chert fragments are especially numerous. In a total of about 9 acres, the soil has slopes of 2 to 5 percent.

Fullerton cherty silt loam, rolling phase, is medium to strongly acid. It is low in organic matter and fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate. Although chert fragments interfere somewhat with cultivation, workability is good in most places. Runoff is medium, and risk of erosion is moderate.

Use suitability (group 11).—Nearly all of this soil is in cutover forest. The soil is suited to most of the general farm crops, but it is not well suited to the more exacting legumes and grasses. It is fairly well suited to row crops. Under average conditions a rotation of corn or tobacco, a small grain, and lespedeza can be used. Heavy fertilization is needed to obtain high productivity. This soil is suited to pasture, but grazing of high quality is more difficult to maintain than on soils of higher fertility.

Fullerton cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Fe).—This soil, one of the most extensive of the Fullerton soils, has lost a considerable part of the original surface soil through erosion. Areas 5 to 60 acres in size are widely distributed on broad ridge crests in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

The plow layer is a grayish-brown friable cherty silt loam. The rest of the profile is similar to that of Fullerton cherty silt loam, rolling phase. Bedrock limestone is at depths of 16 to 40 feet. On the stronger slopes small patches of subsoil have been exposed through erosion. In these areas the plow layer is a yellowish-red or red moderately friable silty clay. In a small total area the soil has 2 to 5 percent slopes.

Fullerton cherty silt loam, eroded rolling phase, is low in fertility and organic matter. It is medium to strongly acid. Permeability is moderate in the surface soil and moderately slow in the subsoil. The soil has a moderate moisture-supplying capacity. Tilth is good, except where subsoil material is exposed or makes up a great part of the plow layer. In most places chert fragments interfere materially with cultivation, but because of favorable slopes, the soil has good workability. The soil is moderately erodible.

Use suitability (group 11).—All of this soil has been cleared and cropped at some time. A large part is now used for crops and pasture, and most of the rest is either idle or is reverting to forest. Some fertilization is practiced, and at least a part of the acreage has been limed.

The soil is suited to crops, but it has only medium productivity because it has low fertility and is cherty. It is suitable for moderately intensive use, but some care is required to control surface runoff. Heavy fertilization is necessary to keep fertility at a high level. The soil is fair for small grains, lespedeza and redtop for hay, and corn, cotton, tobacco, and other row crops. It is suited to pasture, but heavy fertilization and other suitable management are needed.

Fullerton cherty silt loam, hilly phase (12 to 25 percent slopes) (Fg).—This soil occurs in fairly large areas in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

The 7-inch surface soil is a grayish-brown friable

cherty silt loam. The upper part of the subsoil, about 8 inches thick, is a reddish-yellow or yellowish-red friable cherty silty clay loam. The lower part, about 20 inches thick, is a yellowish-red or red firm cherty silty clay; it is plastic when wet. Below the lower part of the subsoil, the soil is a variegated yellowish-red, reddish-yellow, and yellow firm cherty silty clay. Limestone bedrock lies at depths of 10 to 25 feet.

In a total of about 80 acres the soil is free or nearly free of chert fragments.

Fullerton cherty silt loam, hilly phase, is medium to strongly acid and low in fertility and organic matter. Permeability is moderately rapid in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is only moderate. Runoff is rapid, and the soil is moderately to highly susceptible to erosion. Workability is fair.

Use suitability (group 15).—This soil is largely in forest. The strong slopes, chert content, and low fertility make it poor for crops. Normally, chert fragments are numerous enough to interfere with cultivation. If adequately fertilized and properly seeded, the soil is capable of maintaining fairly good pasture. The carrying capacity is not so high as on more fertile soils that have a more favorable supply of moisture.

Fullerton cherty silt loam, eroded hilly phase (12 to 25 percent slopes) (Fd).—This somewhat excessively drained soil on cherty ridges has lost a substantial part of its original surface soil through erosion. It is one of the most extensive Fullerton soils in the county, and it occurs in fairly large areas. It is widely distributed in the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations. In most places the plow layer, a grayish-brown friable cherty silt loam, consists of remnants of the original surface soil mixed with subsoil material. The subsoil layers are similar to those of Fullerton cherty silt loam, hilly phase. Limestone bedrock lies at depths of 10 to 25 feet.

The soil is medium to strongly acid and low in fertility and organic matter. Permeability is moderately rapid in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate. Workability is only fair.

Use suitability (group 15).—All of this soil has been cleared and cropped at some time. Only about one-third is now cultivated. About 50 percent is in pasture, and about 10 to 15 percent is idle. On cropped areas some fertilizer is used, and lime has been applied to about half the soil. Chert fragments, strong slopes, and low fertility make this soil poor for crops. The soil is capable of supplying fairly good grazing vegetation, if adequately fertilized and limed.

Fullerton cherty silt loam, steep phase (25 to 60 percent slopes) (Fk).—This soil is somewhat excessively drained. In profile it is similar to Fullerton cherty silt loam, rolling phase. It differs chiefly in having steeper slopes, a thinner surface soil, and a generally shallower depth to bedrock. Separate tracts occupy extensive areas on steep slopes of cherty ridges. This soil is widely distributed over the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations.

The surface soil, about 6 inches thick, consists of a grayish-brown friable cherty silt loam. The upper part of the subsoil, a reddish-yellow or yellowish-red friable cherty silty clay loam, is about 6 inches thick, and the lower part, a yellowish-red or red firm cherty silty clay, is about 20 inches thick. Bedrock underlies the soil at depths of 5 to 25 feet. A few outcrops of chert rock and limestone occur.

The soil is medium to strongly acid and low in organic matter and fertility. Permeability is moderately rapid in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is low. Normally, cleared areas on south-facing slopes are droughty, but those on north-facing slopes have a better supply of moisture. Workability is poor.

Use suitability (group 20).—Almost all of this soil is in cutover deciduous forest. It is poor for either crops or pasture because it has steep slopes and low fertility and is cherty. The north-facing slopes are better for pasture because of the better moisture-supplying capacity. For good pastures the soil needs to be adequately fertilized and limed.

Fullerton cherty silt loam, eroded steep phase (25 to 60 percent slopes) (Ff).—This soil differs from Fullerton cherty silt loam, steep phase, in having lost much of its surface soil through erosion. It occurs in widely distributed areas on steeper parts of cherty ridges and is associated chiefly with areas of Fullerton cherty silt loam, steep phase. It is in the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations.

The plow layer, a 4- or 5-inch layer of grayish-brown friable cherty silt loam, consists of remnants of original surface soil mixed with subsoil material. The subsoil is similar to that of Fullerton cherty silt loam, steep phase. Limestone bedrock is at depths of 5 to 25 feet.

The soil is medium to strongly acid and is low in fertility and organic matter. It absorbs moisture fairly rapidly, but the steep slopes cause a rapid runoff, so that less moisture infiltrates. The moisture-supplying capacity is low, and the south-facing slopes are generally more droughty than the north-facing slopes. Workability of the soil is poor.

Use suitability (group 20).—All of this soil has been cleared and cropped at one time, but a great part is now either in unimproved pasture or idle. A small part has reverted to pine forest. The soil is poor for either crops or pasture because it has strong slopes and low fertility and is cherty. The north-facing slopes are preferable for pasture, but to establish good grazing, much fertilizer and lime are needed.

Fullerton cherty silty clay loam, severely eroded rolling phase (5 to 12 percent slopes) (Fm).—This well-drained to somewhat excessively drained soil of the uplands has formed from material weathered from cherty dolomitic limestone. Fullerton cherty silt loam, rolling phase, has lost almost all or all of its surface soil and, in places, part of its subsoil through erosion. This soil is associated with the other cherty Fullerton soils. It occurs mostly on slopes in close association with Fullerton cherty silt loam, eroded rolling phase.

The plow layer, a reddish-yellow to red firm cherty silty clay loam or cherty silty clay, consists mostly of subsoil material and is plastic when wet. The subsoil,

a yellowish-red or red firm cherty silty clay, is about 18 inches thick. Bedrock underlies the soil at depths of 15 to 35 feet.

The soil is medium to strongly acid. It has low fertility and a very low supply of organic matter. Moisture infiltrates slowly. Permeability is moderately slow both in the surface soil and in the subsoil. Moisture-supplying capacity is low, and the soil tends to be droughty. Runoff is medium to high, and the risk of further erosion is moderate to high. Workability is fair to poor.

Use suitability (group 14).—All of this soil has been cleared and cropped at some time; a large part is now in unimproved pasture or idle. A small part has reverted to pine forest. Tilth is unfavorable because the plow layer has a fairly high clay content and clods if plowed when wet. The soil is poor for crops because it has unfavorable tilth and low fertility and is droughty. It can be improved for pasture, but much fertilizer and lime and proper seeding are needed to maintain good pastures. Periods during which desirable pastures can be maintained for good grazing are limited because the soil is droughty.

Fullerton cherty silty clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Fl).—This excessively drained droughty soil has lost almost all or all of the original surface soil and, in places, part of the subsoil through erosion. It occurs in small separate areas on hilly slopes of some of the cherty ridges. It is associated with Clarksville soils and with other cherty Fullerton soils. Almost all of it is in the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations.

The plow layer, a reddish-yellow to red friable to firm cherty silty clay loam or cherty silty clay, is plastic when wet. The subsoil, about 18 inches thick, consists of yellowish-red or red firm silty clay. In places gullies are common, but most of them can be filled by deep tillage.

The soil is medium to strongly acid, very low in organic matter, and low in fertility. Tilth is poor. Moisture infiltrates slowly, so runoff develops rapidly during rains. Permeability is moderately slow throughout. The moisture-supplying capacity is low. Workability is poor.

Use suitability (group 20).—All of this soil has been cleared and cropped at some time, but much of it is now either in unimproved pasture or idle. Some of it has reverted to pine forest. Not much is cultivated. The unfavorable tilth, moderately slow permeability, low fertility, and strong slopes make this soil poor for crops. It is poor for pasture because it has low fertility and is cherty. The soil is best suited to forest. If it must be used for pasture, it will need much lime and fertilizer. The carrying capacity of pasture, however, will not be high.

Fullerton cherty silty clay loam, severely eroded steep phase (25 to 60 percent slopes) (Fn).—This soil differs from Fullerton cherty silt loam, steep phase, in having lost practically all, or all, of the original surface soil and, in places, part of the subsoil. It is associated with the other steep Fullerton cherty silt loams.

The plow layer, a reddish-yellow to red, friable to firm cherty silty clay loam or cherty silty clay, is plastic when wet. The subsoil, about 18 inches thick, consists of yellowish-red or red firm cherty silty clay. Limestone bedrock underlies the soil at depths of 5 to 25 feet.

The soil is medium to strongly acid and very low in organic matter and fertility. Permeability is moderately slow in both the surface soil and subsoil. The moisture-supplying capacity is low. Runoff is rapid to very rapid. The soil is highly erodible where it is not protected by close-growing vegetation or by forest. Workability also is very poor. The clayey plow layer has very unfavorable tilth.

Use suitability (group 20).—All of this soil has been cleared and cropped at some time, but most of it is now idle, has reverted to pine forest, or is used for unimproved pasture. The soil is very poor for either crops or pasture because it has steep slopes, an unfavorable supply of moisture, and poor tilth.

Fullerton loam, eroded rolling phase (5 to 12 percent slopes) (Fp).—This well-drained soil of the uplands has formed from material weathered from dolomitic limestone that contains thin sandy layers. The soil has lost much of its surface soil through erosion. The present plow layer consists of remnants of surface soil mixed with subsoil material. Most of this soil occurs on ridge crests; the adjacent slopes are occupied chiefly by hilly Fullerton soils. This soil is widely distributed in the Dewey-Fullerton-Emory and the Fullerton-Clarksville-Greendale soil associations.

Profile description:

Surface soil (plow layer)—
0 to 5 inches, grayish-brown friable loam.
Subsoil—
5 to 10 inches, reddish-yellow friable sandy clay loam; weak medium blocky structure.
10 to 30 inches, yellowish-red or red firm sandy clay; plastic when wet; moderate medium blocky structure.
Parent material—
30 inches +, variegated yellowish-red, reddish-yellow, and yellow firm sandy clay; limestone bedrock underlies the soil at depths of 16 to 40 feet.

The subsoil ranges from about 20 to 30 inches in thickness. In a few patches all of the surface soil has been lost through erosion, and as a result the plow layer now consists of sandy clay subsoil material. A total of about 30 acres has had little or no erosion.

Fullerton loam, eroded rolling phase, is medium to strongly acid and low in organic matter and fertility. Permeability is moderately rapid in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate. Workability is good. The sand content of the subsoil makes this soil more susceptible to gullying than the Fullerton soils that have silty clay subsoils.

Use suitability (group 10).—Nearly all of this soil has been cleared and cropped. At present a large part is used for crops and pasture. Corn, hay, and oats and other small grains are the principal crops. A small acreage is idle. Most of the cropped areas have been fertilized, and much of the soil has been limed. For pasture little fertilizer has been added.

The soil is well suited to many crops, but it needs substantial fertilization and other good management if yields are to be high. Moderately long rotations should be used to control erosion on the cultivated

soil. The more exacting legumes grow fairly well if properly fertilized, but good stands are more difficult to maintain than on more fertile soils. Because this loamy soil is friable and responds well to fertilizer, it is suitable for tobacco, market vegetables, cotton, and other row crops.

Fullerton loam, eroded hilly phase (12 to 25 percent slopes) (Fo).—This well-drained to somewhat excessively drained soil differs from Fullerton loam, eroded rolling phase, mainly in having stronger slopes and, generally, more excessive drainage. It has lost much of its original surface soil through erosion. The soil is widely distributed. It is associated with other Fullerton soils on the cherty ridges.

The plow layer consists of grayish-brown friable loam. The subsoil layers are similar to those of the eroded rolling phase. Bedrock occurs at depths of 10 to 25 feet. A total of about 41 acres has had little or no erosion.

The soil is medium to strongly acid. It is low in organic matter and fertility. Water infiltrates the plow layer well but percolates slowly through the firm subsoil. The moisture-supplying capacity is moderate. Workability is fair, and the risk of erosion is moderate to high.

Use suitability (group 15).—All of this soil has been cleared and cropped at some time. Much of it is now used for pasture or is idle. Generally, fertilizer and lime are used only for row crops or small grains. Because of strong slopes, the suitability of the soil for crops is limited. Long rotations that consist mainly of small grains, hay, and pasture should be used. Corn, tobacco, cotton, and other row crops can be grown only at infrequent intervals. If it is properly fertilized and limed, fairly good pastures can be maintained. The more exacting legumes need heavy fertilization, but they do not grow so well as on the more fertile soils.

Greendale silt loam (2 to 7 percent slopes) (Gb).—This is a well drained to moderately well drained soil of the colluvial lands. Generally, it consists of local alluvial and colluvial materials that washed from uplands underlain by dolomitic limestone. These parent materials have washed chiefly from Fullerton and Clarksville soils and, in places, partly from Pace soils. The soil is gently sloping. It occurs chiefly at the heads of drainageways, on long narrow foot slopes along intermittent drainageways, and on alluvial fans at the bases of strong slopes. It is widely distributed throughout the cherty ridges where Clarksville and Fullerton soils predominate, chiefly in the Fullerton-Clarksville-Greendale soil association.

Profile description:

Surface soil—
0 to 14 inches, grayish-brown to brown friable silt loam; weak medium crumb structure.
Subsurface layer—
14 to 28 inches +, yellowish-brown friable silt loam or silty clay loam; slightly plastic when wet; weak medium blocky structure; limestone bedrock at depths of 5 to 12 feet.

Chert fragments, not numerous enough to make the soil cherty or to interfere with cultivation, occur throughout the soil. Below depths of 3 or 4 feet, the chert content may be high. Below a depth of 15 inches, the subsurface layer in many places is yellower than the surface soil. Below 26 inches, in most places, the soil is mottled yellow and gray.

This soil is medium to strongly acid, low in organic matter, and low to medium in fertility. Tilth is good in the plow layer, and moisture infiltrates readily. The subsurface layer has a favorable supply of moisture, because the soil occurs along drainageways and gentle foot slopes. The moisture-supplying capacity is very high. The soil has very good workability.

Use suitability (group 3).—A very great part of this soil has been cleared and cropped. At present, mostly corn and hay and, to some extent, tobacco and small grains are grown. Lespedeza is the most common hay crop, but some red clover and alfalfa are used. Fertilizer is used for corn, but small grains and tobacco receive greater quantities.

This soil is well suited to intensive use, because it has favorable tilth, easy permeability, good moisture capacity, and a smooth surface. If the soil is substantially fertilized and limed, high productivity can be maintained. Corn and tobacco can be grown several years in succession, if good management is practiced. A favorable supply of moisture makes this soil especially desirable for pasture, because the plants are less affected by drought than on many other more productive soils at higher elevations.

Greendale cherty silt loam (2 to 7 percent slopes) (Ga).—This is a well drained to moderately well drained, gently sloping, cherty soil. It developed from local alluvium and colluvium that was derived mainly from cherty dolomitic limestone. The parent materials have washed chiefly from Fullerton and Clarksville soils. The soil lies in narrow strips along intermittent drainageways and on alluvial fans at the bases of strong slopes among Fullerton and Clarksville soils. This soil is largely in the Fullerton-Clarksville-Greendale soil association. It occurs in positions similar to those of Emory silt loam, but it differs from that soil in having a lighter color, lower fertility, and some chert.

Profile description:

Surface soil—
0 to 14 inches, grayish-brown to brown very friable cherty silt loam; weak medium crumb structure.
Subsurface layer—
14 to 28 inches +, yellowish-brown friable cherty silt loam, or cherty silty clay loam; slightly plastic when wet; limestone bedrock is at depths of 5 to 12 feet.

In most places below a depth of about 26 inches, the profile contains some yellow and gray mottles. In some areas beds of chert occur at depths of 2 to 5 feet. In patches the surface soil is so cherty that tillage is most difficult. In a few places the surface soil is dark brown, or somewhat the color of the surface soil of Emory silt loam.

Greendale cherty silt loam is medium to strongly acid and low in organic matter and fertility. The surface soil has good tilth, but numerous chert fragments interfere with cultivation. Largely because of favorable slopes, workability is good. Permeability is moderately rapid, and the moisture-supplying capacity is high to medium. The soil occurs along drainageways and on alluvial fans that give a good supply

of moisture to the subsurface layer. When dry the surface soil tends to become compact or hard.

Use suitability (group 3).—Most of this soil has been cleared. Two-thirds is in crops, chiefly corn and lespedeza. Most of the rest is in pasture, some of which has been improved by adding fertilizer and lime. A small acreage is idle. This soil is well suited to intensive use, because it is smooth and has a favorable supply of moisture and easy permeability. It is much less suited to crops than some of the more fertile stone-free soils, because it is cherty and low in fertility. If it is heavily fertilized and adequately limed, the soil can be used for row crops several years in succession without great damage from erosion. It is capable of growing good pasture, if it is properly fertilized and limed. During the drier parts of the growing season, its good supply of moisture especially favors growth of pasture.

Gullied land, shale soil materials (5 to 60 percent slopes) (Ge).—This excessively drained miscellaneous land type consists of Litz, Sequoia, Apison, and other severely eroded soils of shale origin. In most places the surface soil has been lost and deep gullies form an intricate pattern. Ordinary farm machinery is not suited to this uneven and rough land type. The land is mostly rolling and steep, and a small part is hilly. The separate areas range from a few acres to about 25 acres in size. They are widely distributed throughout the Litz-Sequoia-Cotaco, the Montevallo-Apison-Cotaco, the Sequoia-Farragut-Hermitage, the Lehew-Montevallo-Cotaco, and the Apison-Sequoia-Leadvale soil associations.

The soil material is predominantly variegated weak-red and yellow shaly silty clay. Bedrock shale is exposed in the gullies and in places on the higher parts between the gullies. The gullies are not deep. Most of them range from 1½ to 3 feet, but some may be as much as 6 feet. A few outcrops of a thin lens of limestone occur.

This land type is very low in organic matter and fertility. Permeability is slow, and the moisture-supplying capacity is very low. The land type has poor tilth and is droughty. It has very poor workability.

Use suitability (group 20).—All of this land type has been cleared and used for crops at some time. Some areas are now under volunteer pine forest. A great part is idle and has a variable cover of briers, sassafras, and weeds. Some areas have been reforested. Except for trees, this land type is of little value. Shortleaf pine is well suited and should produce timber after a period of 25 to 40 years. Kudzu furnishes good cover where it can be established. In places some farmers may find it practical to smooth over these gullied areas, to fertilize them heavily, and to seed to suitable pasture plants.

Gullied land, calcareous sandstone soil materials (5 to 75 percent slopes) (Gc).—This excessively drained miscellaneous land type consists of Tellico and Alcoa soils that have been largely destroyed through erosion. Gullies of widely variable depth make an intricate pattern. Ordinary farm machinery is not suited to this rough land type. The dominant relief is hilly to steep, but a small part is rolling. The gullies range from moderately shallow to very deep; some are as deep as 20 feet. Much original surface soil has been removed, but some remains between gullies. Normally the depth to bedrock is less than 4 feet. This land type is confined to the Tellico-Alcoa-Neubert soil association.

This land type is medium to strongly acid and low in organic matter and fertility. Permeability is moderately slow. The moisture-supplying capacity is low. Most of the acreage is very droughty. Runoff is rapid to very rapid, and the risk of further erosion is very high. Workability is very poor.

Use suitability (group 20).—All of this land type has been cleared and cropped at some time. In places pine forest has redeveloped, but much of the land has a variable cover of briers, sassafras, and weeds. Because of the deep gullies and, in many places, hard rock, this land type is difficult to work to a smooth surface. Most of it is best for pine forest.

Gullied land, limestone soil materials (5 to 60 percent slopes) (Gd).—This excessively drained miscellaneous land type includes areas of Decatur, Dewey, Talbott, Fullerton, Bolton, and other soils of limestone origin that have lost much of their profile through erosion. In most places much or all of the surface soil has been removed and gullies of variable depth have formed an intricate pattern. Ordinary farm machinery is not suited to this rough land type. Generally, the land is rolling and hilly, but a small part is steep. Most of the areas are in the Fullerton-Clarksville-Greendale, the Cumberland-Etowah-Sequatchie, and the Dewey-Fullerton-Emory soil associations.

This land type is medium to strongly acid and low in organic matter and fertility. It has slow permeability. Much of it is droughty, and the moisture-supplying capacity is very low. Workability is very poor.

Use suitability (group 20).—All of this land type has been cleared and cropped at some time. At present much of it has a variable cover of briers, sassafras, and weeds. Some of it has reverted to pine forest. This land type is poor for crops and pasture; most areas are best used as woodland. Heavy farm machinery is used to smooth over some of the less severely gullied areas. If properly fertilized and seeded, these gullied areas are capable of producing fair pasture. In most areas the risk of further erosion is very high, and the cost of preparing the land for pasture would be large.

Hamblen silt loam (0 to 2 percent slopes) (Ha).—This is a brownish somewhat poorly drained soil of the bottom lands. It has formed from general alluvium that washed mainly from soils developed over sandstone and shale. In some places the alluvium contains some materials of limestone origin. This soil is nearly level and is subject to overflow. It occupies much of the bottom lands in the shale valleys. Most of it is in the Litz-Sequoia-Cotaco, the Montevallo-Apison-Cotaco, the Sequoia-Farragut-Hermitage, and the Apison-Sequoia-Leadvale soil associations.

Profile description:

Surface soil—
0 to 8 inches, pale-brown to brown friable silt loam; weak medium crumb structure.

Subsurface layer—
8 to 24 inches, yellowish-brown, mottled with brown and gray, friable silt loam to silty clay loam; slightly plastic when wet; weak medium blocky structure.
Underlying material—
24 inches +, gray, mottled with brownish yellow and brown, friable silty clay loam; plastic when wet; bedrock at depths of 4 to 15 feet.

The depth to the mottling normally ranges from 8 to 20 inches, but in a few wet spots mottling occurs throughout the profile. In many areas small black concretions are on the surface and throughout the profile.

The soil is medium acid to neutral. It contains a moderate amount of organic matter, and its fertility is medium to high. Permeability is moderate throughout. The moisture-supplying capacity is very high. During most of the growing period, the water table occurs at depths of 16 to 40 inches. Tilth is fairly good. The soil puddles somewhat if cultivated when too wet. Workability is good.

Use suitability (group 1).—Much of this soil has been cropped. It is used for corn, hay, and pasture. Lespedeza is the chief hay crop, but some red clover is grown. In places corn is grown for several years in succession. Little fertilizer and lime are used. If fertilized, the soil responds well. Some of the soil does not require lime.

Because the soil is smooth and has medium to high fertility and a good supply of moisture, it is well suited to intensive use for some row crops. Suitability for corn and soybeans is good, but the soil is less well suited to alfalfa, tobacco, truck crops, and cotton. It is particularly suited to hay and pasture.

Hermitage silt loam, undulating phase (2 to 5 percent slopes) (Hd).—This well-drained soil has formed over old local colluvium and alluvium that was derived chiefly from high-grade limestone. In most places the parent material has washed from Decatur and Dewey soils that were derived from high-grade limestone. In some places it has washed from Bolton, Talbott, Fullerton, or Farragut soils that were derived from limestone that contained more siliceous material. The soil occurs chiefly in small areas. Separate tracts are on gently sloping foot slopes directly below soils of the uplands and above narrow strips of Emory silt loam along the drainageways. Most of the soil is in the Sequoia-Farragut-Hermitage, the Dewey-Fullerton-Emory, and the Sequoia-Talbott-Colbert soil associations.

Profile description:

Surface soil—
0 to 10 inches, dark reddish-brown friable silt loam; weak medium crumb structure.
Subsoil—
10 to 30 inches, dark reddish-brown heavy silt loam; with depth, gradual transition to reddish-brown friable silty clay loam; the silty clay loam has a weak medium blocky structure.
Underlying material—
30 inches +, yellowish-red firm silty clay loam to silty clay; plastic when wet; moderate medium blocky structure; material crushes to fine granules; layer contains a few dark-brown to black hard and soft concretions about the size of buckshot; limestone bedrock at depths of 5 to 12 feet.

The surface soil and subsoil layers range considerably in thickness. In practically all areas the color of the surface soil is uniformly dark reddish brown. Where the subsoil layer is not so red, the soil is associated with the Fullerton soils. These areas near the Fullerton soils also have a few chert fragments on the surface and throughout the profile. In some areas, below a depth of about 36 inches, the soil is reddish yellow, but it contains some splotches that are nearly yellow. In places, at a depth of about 20 inches, a few brown or black concretions occur in the soil.

The soil is medium to strongly acid. It contains a moderate amount of organic matter and has medium to high fertility. Permeability is moderate in the surface soil and moderate to slow in the subsoil. Roots penetrate the soil easily. The moisture-supplying capacity is moderate to high. Runoff is slow to medium, and the hazard of erosion is moderate. On the more sloping parts special control of erosion is needed. The soil has very good workability.

Use suitability (group 4).—Practically all of this soil has been cleared. It is used mostly for corn, small grains, cotton, tobacco, and hay. Small areas are in pasture or idle. The soil is one of the most desirable in the county for crops and pasture. It is suited to many crops. The soil is fertilized regularly. Tobacco, cotton, and alfalfa are heavily fertilized. Lime has been applied to most of the soil. Although its fertility is medium to high, the soil responds well if regularly fertilized. The more exacting legumes and grasses grow well, and the carrying capacity of pasture is high. This is one of the more desirable soils for alfalfa, but it is not so well suited to this crop as the Dewey and Decatur soils.

Hermitage silt loam, eroded undulating phase (2 to 5 percent slopes) (He).—This soil differs from Hermitage silt loam, undulating phase, mainly in being moderately eroded. The areas are small to medium sized. A fairly large acreage is associated with the Farragut soils. This soil is associated chiefly with soils of the limestone uplands and with Emory silt loam along intermittent drainageways. Most of it is in the Sequoia-Farragut-Hermitage, the Dewey-Fullerton-Emory, and the Sequoia-Talbott-Colbert soil associations.

The plow layer consists of dark reddish-brown to reddish-brown friable heavy silt loam. The subsoil and underlying material are similar to those of Hermitage silt loam, undulating phase. A few small, more eroded areas are included. These have a yellowish-red friable silty clay loam plow layer. In some areas a few gullies occur, but most of them are not deep enough to interfere with tillage.

The soil is medium to strongly acid, has a moderate content of organic matter, and is medium to high in fertility. Permeability is moderate in the plow layer and moderate to slow in the subsoil. The moisture-supplying capacity is moderate to high. The soil has very good workability.

Use suitability (group 4).—Most of this soil is cultivated. It is suited to the more exacting legumes and to many other crops. If a rotation is used that will control erosion, row crops can be grown. The soil is well suited to pasture, and, under good management, grazing will be good for long periods.

Hermitage silt loam, eroded rolling phase (5 to 12 percent slopes) (Hb).—This soil is similar to Hermitage silt loam, undulating phase, in most profile characteristics; it differs chiefly in having stronger slopes. In many places the plow layer consists of remnants of the original surface soil mixed with subsoil material. This soil occurs in small or medium-sized areas that are widely distributed throughout the Sequoia-Farragut-Hermitage, the Sequoia-Talbott-Colbert, and the Dewey-Fullerton-Emory soil associations.

The plow layer is dark reddish-brown to reddish-brown friable heavy silt loam. The subsoil consists of dark reddish-brown friable heavy silt loam. With depth, there is a gradual transition to reddish-brown friable silty clay loam. The soil includes a total of about 78 acres that are virtually uneroded. Some small, severely eroded areas are also included.

Hermitage silt loam, eroded rolling phase, is medium to strongly acid, has a moderate content of organic matter, and is medium to high in fertility. Permeability is moderate in the plow layer and moderate to slow in the subsoil. The moisture-supplying capacity is moderate. Runoff is medium, and the risk of further erosion is moderate to high. Workability of the soil is good.

Use suitability (group 9).—All of this soil has been cleared. Much of it is used for crops, chiefly corn, hay, and small grains. Tobacco and cotton are common cash crops. Fertilizer and lime are used regularly.

The soil is suited to many crops. Because it has moderately strong slopes, it should be used less intensively than Hermitage silt loam, undulating phase. Generally a moderately long rotation of a row crop, a small-grain crop, and 2 or 3 years of hay is well suited. The more desirable legumes and grasses are well suited for use as hay or pasture. A moderately favorable supply of moisture makes this soil somewhat less droughty than some of the associated rolling soils of the uplands. On the more sloping areas, control of erosion is needed.

Holston loam, eroded undulating phase (2 to 5 percent slopes) (Hf).—This is a light-colored, well drained to moderately well drained soil on moderately high to high stream terraces. Most of these terraces lie 5 to 15 feet above the adjacent flood plains; a few near the Hiwassee River are nearly 100 feet above the flood plains. The soil has formed in old mixed alluvium that was derived from shale, sandstone, and limestone. It has lost much of the original surface soil, and the plow layer now consists of remnants of the original surface soil mixed with subsoil material. The soil is associated chiefly with Holston loam, eroded rolling phase. It occupies stream terraces along the larger streams. Most of it is along the Hiwassee River.

Profile description:

Surface soil (plow layer)—
0 to 5 inches, pale-brown or light yellowish-brown friable loam; weak fine crumb structure.

Subsoil—
5 to 23 inches, brownish-yellow, with depth, gradual transition to yellowish-brown, friable clay loam; moderate fine blocky structure.

Underlying material—
23 inches +, mottled or splotched yellow, gray, and brown firm, brittle, rather compact clay loam; bedrock at depths of 5 to 15 feet.

In a total of about 7 acres the soil is cobbly, but the cobblestones do not interfere with cultivation. In a few areas there are enough cobblestones to interfere with tillage. Along the Hiwassee River some of the soil contains many mica flakes. In some areas along the creeks, the mottled or splotched colors in the profile are somewhat nearer the surface. In some places the texture of the surface layer ranges from fine sandy loam to silt loam. A total of about 60 acres of the soil has had little or no erosion. Here, the surface soil of light yellowish-brown to dark yellowish-brown loose to friable loam is about 8 inches thick.

Holston loam, eroded undulating phase, is strongly acid and is low in organic matter and fertility. Permeability and the moisture-supplying capacity are both moderate. The soil has excellent workability.

Use suitability (group 5).—All of this soil has been cleared. The soil is now used for corn, tobacco, cotton, small grains, and some hay crops. Some fertilization is practiced, but substantial applications of fertilizer, organic matter, and lime are necessary to obtain high yields of any of the crops.

The soil is suited to many crops and can be used in a moderately short rotation if the fertility is kept at a high level. The erosion in cultivated areas is not difficult to control. The more exacting legumes and grasses are suited, but stands are somewhat more difficult to maintain than on some of the soils of higher fertility.

Holston loam, eroded rolling phase (5 to 12 percent slopes) (He).—This light-colored, well-drained to somewhat excessively drained soil differs from Holston loam, eroded undulating phase, chiefly in having stronger slopes. It occurs on high to moderately high stream terraces along some of the larger streams of the county. Most of it is along the Hiwassee River.

The plow layer now consists of remnants of the original surface soil mixed with subsoil material. In most places it is pale-brown or light yellowish-brown friable loam. In patches where erosion has removed much of the surface soil, the plow layer is friable clay loam. In about 15 acres, the soil is cobbly and the cobblestones interfere somewhat with cultivation. In about 4 acres the soil is both cobbly and hilly, and the strong slopes and cobblestones interfere considerably with cultivation. In a few places there are a few uneroded areas.

Holston loam, eroded rolling phase, is strongly acid and low in organic matter and fertility. Permeability and the moisture-supplying capacity are both moderate. Except in the cobbly areas the soil has good workability.

Use suitability (group 10).—Nearly all of this soil has been cleared and cropped at some time. The principal crops now grown are corn and hay. To some extent, small grains, cotton, and tobacco are grown. About one-third of the soil is used for pasture or is idle. Some fertilizer is used, and some areas have been limed.

Because of moderately strong slopes, this soil is

not suited to intensive use. Moderately long rotations and substantial fertilization are needed to keep this soil highly productive. Generally small grains, hay, and other close-growing crops are best suited. The more exacting legumes and grasses for hay and pasture can be grown. Good stands are somewhat more difficult to maintain than on the well-drained more fertile soils. This soil is moderately well suited to pasture.

Huntington silt loam (0 to 3 percent slopes) (Hh).—This reddish-brown to dark-brown, well-drained soil of bottom lands has formed from recent general alluvium that was washed largely from soils underlain by limestone. It occurs on level or nearly level first bottoms. It is subject to overflow, and new materials are added to it by floodwaters. The soil occurs in small elongated areas along streams in limestone valleys. It is closely associated with Huntington loam and Lindside and Melvin soils of the bottom lands. Decatur, Dewey, Colbert, Talbott, and Fullerton soils and other soils formed over limestone occur mostly on adjacent uplands. Most of this soil is in the Dewey-Fullerton-Emory and the Cumberland-Etowah-Sequatchie soil associations.

Profile description:

Surface soil—
0 to 20 inches, reddish-brown, grading with depth to dark brown, friable silt loam; weak fine crumb structure.
Subsurface layer—
20 to 34 inches, dark-brown to brown friable heavy silt loam to silty clay loam; weak medium granular structure.
Underlying material—
34 inches +, alluvium consisting mainly of sand, silt, and clay; in some places the material is mottled or splotched with gray; limestone bedrock at depths of 8 to 15 feet.

The surface soil ranges from about 15 to 26 inches in thickness, and the subsurface layer, from about 12 to 20 inches.

The soil is medium acid to almost neutral. It is moderately high in organic matter and high in content of plant nutrients. Permeability is moderate throughout. The moisture-supplying capacity is very high. Because the soil is nearly level, there is no erosion problem. Workability is very good.

Use suitability (group 1).—All of this soil is used for crops or pasture. Little or no fertilizer is applied. The soil is very well suited to annual hay and other crops and to pasture. It is well suited to intensive use for row crops, particularly corn. Because of the rather high water table, winter flooding, and freezing and heaving, the soil is not well suited to fruits or alfalfa. Small grains tend to lodge and are more affected by rust than on soils of the uplands.

Huntington loam (0 to 3 percent slopes) (Hg).—This reddish-brown to dark-brown soil of bottom lands has formed on first bottoms from recent general alluvium that washed chiefly from soils underlain by limestone.

The soil is level or nearly level. Most of it lies next to streambanks, where it is subject to overflow. It differs from Huntington silt loam primarily in having a coarser texture, slightly better drainage, and more rapid permeability. This soil is associated with Huntington silt loam and with the Lindside and Melvin soils on first bottoms.

The surface soil, 15 to 26 inches thick, consists of reddish-brown friable loam that grades to dark brown with depth. The subsurface layer, about 12 to 20 inches thick, is dark-brown to brown friable heavy loam to clay loam. Below this is light-brown to dark reddish-brown alluvium of variable texture. Below a depth of about 36 inches, the soil normally contains some gray mottles or splotches. Bedrock lies at depths of 8 to 15 feet.

The soil is medium to slightly acid, and it is moderately high in organic matter and high in fertility. Permeability is moderately rapid throughout, and the moisture-supplying capacity is very high. There is no risk of erosion. The soil has very good workability.

Use suitability (group 1).—Nearly all of this soil is under cultivation. It is well suited to intensive use for row crops, particularly corn. It is well suited to hay crops, but because of winter flooding, rather high water table, and freezing and heaving, alfalfa may not do well. The soil is not well suited to fruits, and small grains do well only on those areas that are less subject to flooding. The soil is well suited to pasture.

Jefferson loam, eroded undulating phase (2 to 5 percent slopes) (Jb).—This light-colored well-drained soil is on old colluvium and local alluvium that was derived from uplands underlain chiefly by shale and sandstone. The parent materials have been washed mainly from Montevallo and Lehew-Montevallo soils. This soil occurs on gentle foot slopes below higher lying areas of Lehew-Montevallo and Montevallo soils. Much of it is in the Lehew-Montevallo-Cotaco association or along drainageways in adjacent associations in areas of Lehew-Montevallo soils. Some areas of this soil are at the base of White Oak Mountain in the Montevallo-Muskingum-Jefferson-Barbourville association.

Profile description:

Surface soil—
0 to 5 inches, brownish-yellow to dark yellowish-brown friable loam.
Subsoil—
5 to 23 inches, yellowish-brown to strong-brown friable clay loam; weak fine blocky structure.
23 to 32 inches, mottled yellow, yellowish-red, and gray firm and brittle clay; weak medium blocky structure; some shale fragments.
Underlying material—
32 inches, strongly splotched very pale brown, gray, and yellowish-red friable to firm and brittle clay loam; shale bedrock at depths of 4 to 15 feet.

A total of about 23 acres of the soil has not been affected by erosion. In places the color of the profile is modified by red soil material that has washed from Lehew soils. Included are a few areas that have a silt loam surface soil.

Jefferson loam, eroded undulating phase, is low in fertility and in content of organic matter. It is strongly acid. Permeability and the moisture-supplying capacity are both moderate. If fertilized the soil responds well. It is only slightly to moderately subject to erosion. Workability is excellent. The soil can be worked throughout a wide range of moisture

conditions. The risk of further erosion is slight to moderate.

Use suitability (group 5).—Practically all of this soil has been cultivated. Most of it is used for crops and the rest for unimproved pasture. Little fertilizer is used. Lime has been applied to some of the soil. Because of its low fertility, the soil needs to be heavily fertilized if yields are to be good.

The soil is suited to crops and pasture. Many crops can be grown. Most of it can be cropped if a moderately short rotation is used. The more exacting legumes and grasses can be grown, but stands are more difficult to maintain than on more fertile soils.

Jefferson loam, rolling phase (5 to 12 percent slopes) (Jc).—This soil differs from Jefferson loam, eroded undulating phase, chiefly in having stronger slopes and in having little or no erosion. The soil has formed from materials that were washed predominantly from Lehew and Montevallo soils. Most of this soil is associated with Lehew and Montevallo soils along the base of White Oak Mountain in the Lehew-Montevallo-Cotaco and the Montevallo-Muskingum-Jefferson-Barbourville soil associations.

The surface soil, about 8 inches thick, is grayish-brown or pale-yellow friable loam. In undisturbed areas the uppermost 2 inches is dark yellowish brown and high in organic matter. The subsoil and underlying material are similar to those of the undulating phase, and bedrock shale is at depths ranging from 3 to 12 feet. A small area is hilly. Along the base of White Oak Mountain, there are a few sandstone fragments in the areas.

This soil has low fertility and a low content of organic matter and is strongly acid. Permeability and the moisture-supplying capacity are both moderate. Risk of erosion is moderate. Workability is very good.

Use suitability (group 10).—Practically all of this soil is in cutover deciduous forest. If cleared the soil is well suited to tilled crops, but, because of its low fertility and moderately strong slopes, the use of fairly long rotations is required. The common crops will produce well if adequately fertilized and if other proper management practices are used, but stands of the more exacting legumes and grasses are more difficult to maintain than on some of the more productive soils. This soil is moderately well suited to pasture.

Jefferson loam, eroded rolling phase (5 to 12 percent slopes) (Ja).—The plow layer of this eroded soil consists of remnants of the original surface soil mixed with subsoil material. It is the most extensive Jefferson soil in the county. Most of it is on gentle foot slopes in association with Lehew and Montevallo soils.

To a depth of about 5 inches the plow layer is brownish-yellow to dark yellowish-brown friable loam. The subsoil, about 13 inches thick, is yellowish-brown to strong-brown friable clay loam. The underlying material is similar to that of Jefferson loam, eroded undulating phase. Slate bedrock occurs at depths of 2½ to 10 feet.

In patches on the stronger slopes where the subsoil is exposed, the plow layer is yellow or yellowish-brown friable clay loam. In places where materials of shale origin predominate, the surface soil is friable silt loam. In about 25 acres, the soil is hilly and its slopes range from 12 to 20 percent.

Jefferson loam, eroded rolling phase, is low in fertility and organic matter and is strongly acid. Permeability and the moisture-supplying capacity are both moderate. Runoff is medium. The risk of erosion is moderate. Workability is good.

Use suitability (group 10).—Nearly all of this soil has been cultivated and is now used for crops and pasture. Much is in unimproved pasture. A small part is idle. Corn, cotton, small grains, and hay, mainly lespedeza, are the chief crops. Although the soil responds well if properly fertilized, most of it is not fertilized at a high rate.

Because of the rather strong slopes, the soil is not suited to intensive use for row crops. If good management is practiced, it can be kept productive under a 4-year rotation in which a cultivated crop is grown for only 1 year. Where fertility is brought to a high level, the more exacting legumes and grasses can be grown. Stands of these legumes and grasses are more difficult to maintain on this soil than on some of the more fertile soils. The soil is fairly well suited to pasture, but grazing periods will not be long because the soil tends to be droughty.

Leadvale silt loam, undulating phase (2 to 5 percent slopes) (Lc).—This somewhat poorly drained to moderately well drained soil in shale valleys has formed from old colluvial and alluvial materials that were derived chiefly from shale and sandstone and, in places, from limestone. These parent materials have washed largely from Litz, Apison, Montevallo, and Sequoia soils. This soil is on gentle foot slopes along drainageways and is associated with Litz and Sequoia soils. Most of it is in the Montevallo-Apison-Cotaco, the Lehew-Montevallo-Cotaco, the Apison-Sequoia-Leadvale, and the Litz-Sequoia-Cotaco soil associations.

Profile description:

Surface soil—
0 to 7 inches, light yellowish-brown to brownish-yellow friable silt loam.

Subsoil—
7 to 16 inches, yellowish-brown or brownish-yellow friable to firm silty clay loam; plastic when wet; moderate fine blocky structure.

Pan layer—
16 to 32 inches, mottled gray, brownish-yellow, and reddish-brown firm silty clay or silty clay loam; strong medium blocky structure.
32 inches +, mottled gray, brownish-yellow, and reddish-brown firm or compact silty clay; much of this material has a platy structure; shale bedrock at depths of 3 to 10 feet.

In some places, especially in the more nearly level areas, the surface soil is brown.

The soil is low in fertility and organic matter and is medium to strongly acid. Permeability is moderate in the surface soil, but slow in the subsoil because the subsoil is sufficiently firm. The moisture-supplying capacity is moderate. Because the lower part of the subsoil is not easily permeable to roots, this soil is not so well suited to alfalfa and other deep-rooted legumes as soils of the Decatur, Dewey, and Hermitage series. Workability is very good. The soil is only moderately susceptible to erosion.

Use suitability (group 6).—Nearly all of this soil is used for crops or pasture. Rotations of corn or cotton, a small grain, and hay are used mainly. Oats and barley are the small grains grown most frequently. The soil responds well to fertilizer. Most areas receive some fertilizer and have been limed. Because the soil is smooth, has fairly good permeability, and responds well to fertilizer, it is well suited to most of the common crops. It is rather poor for alfalfa and less suited to truck crops than more permeable open soils because it has retarded internal drainage and low fertility. If adequately fertilized, this soil will grow most of the grasses and legumes. If a high level of fertility is maintained, the soil can be used in a fairly short rotation. Some care is required to control runoff on the more sloping parts.

Leadvale silt loam, eroded undulating phase (2 to 5 percent slopes) (Lb).—This soil occurs on gently sloping areas at the bases of steeper slopes occupied by Litz, Sequoia, Apison, and Montevallo soils. It differs from Leadvale silt loam, undulating phase, in being moderately eroded. This erosion has caused the surface soil to be more variable in color, texture, and thickness than that of the undulating phase. In many areas a few gullies occur. The plow layer of most of this soil consists of remnants of original surface soil mixed with subsoil material. This eroded undulating phase is widely distributed in the shale valleys throughout the county. It occurs in medium-sized areas, principally in association with Litz, Sequoia, Apison, and other Leadvale soils. Most of it is in the Apison-Sequoia-Leadvale association.

The present plow layer, about 5 inches thick, is pale-yellow to yellowish-brown friable silt loam or heavy silt loam. In the more severely eroded areas, it is yellowish-brown friable to firm silty clay loam. The rest of the profile is similar to that of Leadvale silt loam, undulating phase.

The soil is medium to strongly acid and low in organic matter and fertility. Permeability is moderate in the surface soil but slow in the subsoil. The moisture-supplying capacity is moderate. Runoff is slow to medium, and the risk of erosion is moderate. Workability is very good.

Use suitability (group 6).—All of this soil is being used for crops or pasture. Because it has a smooth surface and responds well to fertilizer, it is moderately well suited to some crops. Slow internal drainage and low fertility make it poor for alfalfa and not well suited to truck crops. If adequately limed and fertilized, the soil will produce most of the grasses and legumes used for pasture or hay.

Leadvale silt loam, eroded rolling phase (5 to 12 percent slopes) (La).—This somewhat poorly drained to moderately well drained soil differs from Leadvale silt loam, undulating phase, chiefly in having stronger slopes and in being eroded. Because of erosion the plow layer consists of remnants of the original surface soil mixed with subsoil materials. This soil is widely distributed on foot slopes in association with Litz, Apison, and Sequoia soils. A large part of the soil is in the Apison-Sequoia-Leadvale, the Litz-Sequoia-Cotaco, and the Montevallo-Apison-Cotaco soil associations.

The plow layer, about 5 inches thick, is pale-yellow to yellowish-brown friable silt loam or heavy silt loam. The rest of the profile is similar to that of Leadvale silt loam, undulating phase. In many places the more exposed parts have lost all of the surface soil and the present plow layer consists of yellowish-brown friable to firm silty clay loam. In a total of about 81 acres, there has been very little or no erosion and the surface soil, about 7 inches thick, is light yellowish-brown to brownish-yellow friable silt loam.

This soil is low in organic matter and fertility and medium to strongly acid. Erosion limits the moisture-absorbing capacity, because the more slowly permeable subsoil is within a few inches of the surface. The moisture-supplying capacity is low, and the more eroded areas are droughty. Runoff is medium, erodibility moderate, and workability good.

Use suitability (group 12).—This soil has nearly all been cleared and cropped. Most of it is now used for crops, chiefly corn, cotton, and hay. Lespedeza is the predominant hay crop. About one-fourth of the soil is used for pasture; some areas are idle. The soil is suited to tilled crops, but because it has strong slopes and low fertility, it needs fairly long rotations. Much of it could be used in a rotation consisting of a small grain, hay, and pasture. Corn, tobacco, and cotton are among the row crops that can be grown infrequently. Truck crops are not well suited, chiefly because of the shallow depth to the firm or less friable subsoil. Most of the more desirable legumes and grasses can be grown, but the low fertility makes good stands more difficult to maintain on this soil than on more fertile soils. Some fertilizer and, in some areas, lime have been applied.

Lehew-Montevallo loams, hilly phases (12 to 25 percent slopes) (Lg).—This soil complex consists of shallow to very shallow droughty soils of very low fertility. The Lehew soil has formed from material weathered in place from dusky-red or weak-red acid sandstone and shale. The Montevallo soil has formed from material weathered in place from gray, olive-gray, or dark yellowish-brown acid shale. This complex of soils is in the Lehew-Montevallo-Cotaco soil association.

Profile description:

Lehew loam, hilly phase:
- Surface soil—
  - 0 to 5 inches, weak-red loose loam or fine sandy loam.
- Subsurface layer—
  - 5 to 11 inches, light reddish-brown to reddish-brown friable loam; has many shale fragments; shale bedrock at depths of 1 to 2 feet.

Montevallo loam, hilly phase:
- Surface soil—
  - 0 to 5 inches, pale-yellow to dark yellowish-brown friable loam or silt loam.
- Subsurface layer—
  - 5 to 11 inches, brownish-yellow to dark yellowish-brown friable heavy shaly silt loam or shaly silty clay loam; gray or olive-gray fissile shale at depths of ½ to 1½ feet.

As mapped this complex includes sandy soils on much of the slopes of White Oak Mountain. These soils contain many hard, brown sandstone fragments.

Lehew-Montevallo loams, hilly phases, are low in

organic matter and are medium to strongly acid. Permeability is moderate, but shallow depth to bedrock limits the amount of water the soils can absorb and hold. The strong slopes and the low moisture-holding capacity cause runoff to accumulate and flow rapidly during rains. The south-facing slopes are more droughty than the north-facing slopes. If cleared and cropped, this complex is highly susceptible to sheet erosion and to the formation of gullies. Workability is only fair.

Use suitability (group 18).—Practically all of this soil complex is in cutover deciduous and pine forest. Shallowness to bedrock, very low fertility, and rather strong slopes make the soils poor for crops and pasture. If adequately fertilized and limed and with other careful management practices, they can be brought to a level where they will support some pasture. Care is needed to maintain a good cover. Many areas can best be used for forest.

Lehew-Montevallo loams, eroded hilly phases (12 to 25 percent slopes) (Ld).—This soil complex has lost much of its original surface soil through erosion. The subsurface layer consists of shaly material. Bedrock shale is normally at depths of ½ to 1½ feet, but it outcrops in places. This soil complex is in the Lehew-Montevallo-Cotaco soil association.

This complex is strongly acid and is very low in fertility and in organic matter. It is highly erodible; many shallow gullies have developed. The complex is very shallow to shallow, has rapid runoff, and absorbs a limited amount of moisture. Its moisture-supplying capacity is low. Workability is poor.

Use suitability (group 18).—All of this soil complex has been cropped. About 20 percent produces mostly corn. About one-half is in unimproved pasture, and the rest is idle or has reverted to pine forest. Little fertilizer or lime has been applied. The soil complex responds poorly to fertilizer. The fertility level cannot be raised to any appreciable extent. A few areas have been terraced, but in many places the terraces have collapsed. There is apparently not enough binding clay to hold the soil material in place.

Low fertility, shallowness, and hilly surface relief make this soil complex poor for crops and pasture. If pasture is needed, however, some of the more favorable areas can be brought to a level of fertility that will permit growth of fair pasture.

Lehew-Montevallo loams, rolling phases (5 to 12 percent slopes) (Lh).—This soil complex differs from Lehew-Montevallo loams, hilly phases, chiefly in having a smoother relief and a somewhat less shaly surface soil. It occurs on narrow ridge crests in the Lehew-Montevallo-Cotaco soil association.

The Lehew surface soil, about 4 inches thick, is weak-red loose loam or fine sandy loam. Some shale fragments are intermixed. The subsurface layer, about 6 inches thick, is light reddish-brown to reddish-brown friable loam. It contains many shale fragments. Underneath there is a mixture of shale and soil material. Bedrock is at depths of 1 to 2 feet.

The Montevallo soil occupies the smaller part of this complex. The surface soil, a brownish-yellow to dark yellowish-brown friable loam or silt loam, is about 4 inches thick. The subsurface layer, 4 to 5 inches thick, consists of brownish-yellow to dark yellowish-brown friable heavy shaly silt loam or shaly silty clay loam. Underneath, the material is more shaly, and in most places it consists of a mixture of brownish-yellow friable silt loam and olive-gray fissile shale. Bedrock lies at depths of ½ to 1½ feet.

This soil complex is low in organic matter and very low in fertility. It is medium to strongly acid. Nearness of bedrock to the surface restricts absorption of moisture, and the quantity of moisture available to plants is low. The risk of erosion is moderate. This soil complex has only fair workability.

Use suitability (group 16).—All of this soil complex is in cutover deciduous and pine forest. The growth of crops is limited because the soil complex is shaly and shallow and very low in fertility. It occurs in narrow strips on the crests of steep ridges, where it is difficult to cultivate. Much of it can be used better for forest than for crops.

Lehew-Montevallo loams, eroded rolling phases (5 to 12 percent slopes) (Le).—This soil complex consists of cropped areas that have lost much of their surface soil through erosion. The plow layer is about 4 inches thick. The subsurface layer contains many shale fragments. Depth to bedrock shale is 1 to 2 feet in the Lehew soil and ½ to 1½ feet in the Montevallo soil. In the more eroded parts there are shale outcrops. The soil complex occurs in narrow strips on the crests of steep ridges and is not easily accessible as cropland. It is mostly in the Lehew-Montevallo-Cotaco soil association.

The soils are medium to strongly acid and very low in fertility and in organic matter. Permeability is moderate. The moisture-supplying capacity is low. Runoff is medium. The soil complex is moderately erodible. Workability is only fair.

Use suitability (group 16).—This soil complex is used for crops and pasture. These soils are poor for crops. Corn, small grains, and lespedeza, redtop, and other hay and pasture plants will produce fair yields, if the soil complex is heavily fertilized and other good management practices are employed. The soils provide fair pasture, but the grazing period is greatly limited by the low moisture-holding capacity.

Lehew-Montevallo loams, steep phases (25 to 60 percent slopes) (Lk).—This soil complex differs from Lehew-Montevallo loam, hilly phases, chiefly in having stronger slopes. This is the most extensive Lehew-Montevallo soil complex in the county. Most of it is in the Lehew-Montevallo-Cotaco soil association.

The Lehew soil has a 5-inch surface soil of weak-red loose loam or fine sandy loam. The subsurface layer, a light reddish-brown to reddish-brown friable loam, contains many shale fragments. The Montevallo soil has a 5-inch, pale-yellow or brownish-yellow friable loam or silt loam surface soil and a brownish-yellow to dark yellowish-brown friable heavy shaly silt loam or shaly silty clay loam subsurface layer. Bedrock is within 1½ feet of the surface in both soils, and outcrops occur in places.

Lehew-Montevallo loams, steep phases, are medium to strongly acid, low in organic matter, and very low in fertility. Permeability is moderate. These soils are shallow to bedrock, and the quantity of moisture

that can be absorbed is limited. Runoff is rapid to very rapid. The soils have a low moisture-supplying capacity. They are highly erodible. Workability is very poor.

Included in this complex are areas of Montevallo silt loam that occur on slopes of more than 25 percent. Also included are sandy soils on the slopes of White Oak Mountain. These soils contain many hard, brown sandstone fragments.

Use suitability (group 20).—Most of this soil complex is in cutover deciduous and pine forest. Because these soils are shallow to bedrock, strongly sloping, and low in fertility, they are poor for crops and pasture. Most areas can best be used for trees.

Lehew-Montevallo loams, eroded steep phases (25 to 60 percent slopes) (Lf).—This soil complex consists of cleared and cropped areas that have lost much of their surface soil through erosion. The subsurface layers contain many shale fragments. Shale bedrock occurs at depths of 1 foot or less, and there are some outcrops. This complex is widely distributed throughout the Lehew-Montevallo-Cotaco soil association.

The soils are medium to strongly acid and very low in organic matter and fertility. Permeability is moderate. Because these soils are shallow to bedrock, the quantity of water they can absorb is greatly limited. These soils are highly susceptible to further erosion. Workability is very poor.

Use suitability (group 20).—All of this complex has been cropped at some time. Much of it is now either idle or is used as unimproved pasture. Some has reverted to pine forest. The acreage cropped is very small. Because these soils have steep slopes and are shallow to bedrock and very low in fertility, they are poor for crops and pasture. Almost all areas are best for trees.

Lindside silt loam (0 to 3 percent slopes) (Ll).—This somewhat poorly drained soil of the bottom lands was derived from alluvium that originated chiefly in uplands underlain by limestone. It is intermediate in drainage between the Huntington and Melvin soils and is closely associated with those soils. It occurs on first bottoms along the larger streams and is subject to periodic overflow. This soil is distributed throughout the county, but most of it is in the Dewey-Fullerton-Emory and the Sequoia-Talbott-Colbert soil associations.

Profile description:

Surface soil—
0 to 14 inches, brown to dark-brown friable silt loam or friable heavy silt loam; medium crumb structure.
Subsurface layer—
14 to 47 inches +, mottled yellowish-brown, gray, and brown firm silty clay; very plastic when wet; contains a few black concretions of variable size; limestone bedrock at depths of 4 to 15 feet.

The depth to mottling varies from about 12 to 18 inches in most places. Marshy areas, too small to map at the scale used, occur in some places.

The soil is slightly acid to neutral throughout and contains a moderate quantity of organic matter. It is high in plant nutrients and very high in moisture-supplying capacity. Workability is good. Excess moisture may delay seeding. Because of the low position of the soil along streams, suitable outlets for artificial drainage are difficult to obtain.

Use suitability (group 1).—This nearly level soil complex is well suited to intensive use because it has good tilth, responds well if fertilized, and has a favorable supply of moisture. Suitability for crops is somewhat limited because of the slow permeability of the subsurface layer and susceptibility to flooding. Corn is one of the better suited crops. Many of the legumes and grasses are productive. The soil is poor for alfalfa. Market vegetables, tobacco, and cotton are among the less well suited crops. Where flooding is likely to occur during the growing season, there may be some risk in growing such high-value crops as tobacco. Small grains tend to lodge. If the soil complex is moderately fertilized and weeds are eliminated, then rather high yields of corn, legumes, and grasses can be expected.

Litz shaly silt loam, rolling phase (5 to 12 percent slopes) (Lr).—This light-colored shallow soil has formed over acid shale parent rock that contains a few layers of limestone. It occurs principally on slopes next to drainageways in Sequoia soil areas or on ridgetops in Litz soil areas. It is associated with other Litz soils and with Sequoia soils. Much of it is in the Litz-Sequoia-Cotaco and the Sequoia-Farragut-Hermitage soil associations.

Profile description:

Surface soil—
0 to 4 inches, pale-brown to light yellowish-brown friable shaly silt loam.
Subsurface layer—
4 to 9 inches, brownish-yellow friable shaly silt loam or shaly silty clay loam; moderate medium subangular blocky structure.
Underlying material—
9 inches +, variegated yellow, yellowish-red, and strong-brown very shaly silty clay loam; bedrock fissile shale at depths of 1 to 2 feet.

Much of the shale is soft and easily crushed, but in a few places it is moderately hard and is more nearly a pale yellow or pale olive.

This soil is low in fertility and organic matter and is medium to strongly acid. Permeability is moderate, and moisture infiltrates easily, but the shallow depth to bedrock greatly limits the moisture-holding capacity. Although the bedrock retards infiltration of moisture, it does absorb it to some extent. The soil is more droughty than many of the deeper soils. The moisture-supplying capacity is low. Runoff is medium, and the risk of erosion is moderate. Workability is good.

Use suitability (group 16).—This soil is in cutover deciduous forest. Its low fertility, shallow depth, and rolling surface limit its suitability for tilled crops. If cleared and properly fertilized, limed, and seeded, the soil grows small grains and alfalfa and most of the other more desirable legumes and grasses. Except in dry periods, permanent pasture of bluegrass and whiteclover grows fairly well under good management.

Litz shaly silt loam, eroded rolling phase (5 to 12 percent slopes) (Ln).—This soil has been cultivated, and much of it has been lost through erosion. It is the most extensive Litz soil in the county. It occupies a large part of the Litz-Sequoia-Cotaco soil association.

In most places the plow layer, about 5 inches thick, is a brownish-yellow friable shaly silt loam or shaly silty clay loam. The subsurface layer is similar to that of Litz shaly silt loam, rolling phase, but bedrock is at depths of ½ to 1½ feet. In many places the plow layer is very thin, and occasionally shale outcrops occur. Shallow gullies have formed in many of the more sloping areas.

The soil is low in fertility and organic matter and is medium to strongly acid. Its ability to absorb and hold moisture is very limited, and its moisture-supplying capacity is low. Workability is fair. The risk of further erosion is moderate to high.

Use suitability (group 16).—All of this soil has been cleared and cropped at some time. Some of it has been abandoned or has been left idle. Much is used as unimproved pasture. Some is used for corn, cotton, small grains, lespedeza, and other crops.

Because this soil is droughty, low in fertility, and susceptible to erosion, it is poor for crops. It can support fairly good pasture if adequately fertilized and properly seeded. Under proper management whiteclover and bluegrass are suited. Although bedrock shale is near the surface, a fair seedbed or plow layer can be developed by breaking the shale with heavy tillage implements. The small gullies can be eliminated by the same means. Where such practices are followed, the hazard of additional erosion is great until a good close-growing cover has been developed. Areas that must be cropped are best suited to rotations of small grains, hay, and pasture. Small grains are better suited than corn and other crops, because they mature before the drier part of the growing season starts.

Litz shaly silt loam, eroded undulating phase (2 to 5 percent slopes) (Lo).—This soil differs from Litz shaly silt loam, rolling phase, chiefly in being smoother and in being eroded. Most of the cleared areas have been much eroded. This soil is widely distributed in the Litz-Sequoia-Cotaco soil association.

Normally the plow layer, a brownish-yellow friable shaly silt loam or shaly silty clay loam, is about 5 inches thick. The subsurface layer is similar to that of Litz shaly silt loam, rolling phase. Bedrock lies at depths of 1 to 2 feet. In a total of about 7 acres little or no erosion occurs.

Litz shaly silt loam, eroded undulating phase, is low in fertility and organic matter and is medium to strongly acid. The moisture-supplying capacity is low, mainly because the soil is shallow to bedrock. The soil material present, however, is friable and moderately permeable, and where bedrock shale is near the surface, it can be broken by heavy tillage implements to form an easily tillable plow layer. The risk of further erosion is moderate. Workability is good.

Use suitability (group 16).—Most of this soil has been cropped. At present about 40 percent is in crops, about 40 percent is in pasture, a small part is in forest, and the rest is idle. Most of the crops receive some fertilizer. Much of the soil has been limed. The soil responds to fertilization, but its fertility cannot be profitably raised to a high level.

The shallow depth to bedrock, low fertility, and limited moisture-supplying capacity greatly restrict productivity and range of suitability for crops. If adequately fertilized, the soil is suited to corn and to some other row crops, to small grains, and to legume-grass hay and pasture. It also is suited to alfalfa. During prolonged dry periods corn is likely to be injured by drought. For good pasture stands, the soil needs to be substantially fertilized and limed.

Litz shaly silt loam, hilly phase (12 to 25 percent slopes) (Lp).—This soil is similar to Litz shaly silt loam, rolling phase, in profile characteristics. It differs principally in having stronger slopes and shallower depth to shale bedrock. It occurs on the stronger slopes in association with other Litz soils and with Sequoia soils, chiefly in the Litz-Sequoia-Cotaco soil association.

The surface soil, a pale-brown to light yellowish-brown friable shaly silt loam, is about 4 inches thick. The subsurface layer, about 4 inches thick, consists of brownish-yellow friable shaly silt loam or shaly silty clay loam. Below this is variegated yellow, yellowish-red, and strong-brown friable very shaly silty clay loam. Bedrock is at depths of ½ to 1½ feet.

The soil is medium to strongly acid and low in organic matter and fertility. Permeability is moderate. Shallowness to bedrock greatly limits the moisture-absorbing capacity. Runoff is rapid, and the risk of further erosion is high. The soil has only fair workability.

Use suitability (group 18).—Nearly all of this soil is in cutover deciduous forest. It is poor for tilled crops because of its shallowness to bedrock, strong slopes, and low fertility. If adequately fertilized, however, it can support fairly desirable grasses and legumes for pasture. The carrying capacity of pasture is greatly limited by the droughtiness of the soil, and the pasture cover must be adequate to protect against erosion.

Litz shaly silt loam, eroded hilly phase (12 to 25 percent slopes) (Lm).—This soil differs from Litz shaly silt loam, hilly phase, in having been cropped and, consequently, eroded. This eroded soil is widely distributed in the Litz-Sequoia-Cotaco soil association.

The plow layer, a brownish-yellow friable shaly silt loam or shaly silty clay loam, is about 5 inches thick. Below this is variegated yellow, yellowish-red, and strong-brown friable very shaly silty clay loam. Shale bedrock lies at depths of ½ to 1 foot; it outcrops in places. Some shallow gullies have developed.

The soil is very low in organic matter, low in fertility, and medium to strongly acid. Permeability is moderate throughout the profile, but the moisture-supplying capacity is low. The risk of further erosion is high. Workability is poor.

Use suitability (group 18).—All of this soil has been cropped at some time. Approximately half of it is now used for unimproved pasture, and about one-fourth is virtually abandoned or is idle. The rest is used for corn, small grains, and lespedeza. Little fertilization is practiced, but some areas have been limed. Shallowness to bedrock and strong slopes make this soil poor for crops. If adequately fertilized and limed and properly seeded, most of it can support a fair stand of whiteclover and bluegrass and other desirable pasture grasses and legumes. The grazing period is greatly restricted by the droughtiness of the soil. During the drier periods the pasture must be supple-

mented by pasture on soils having a better supply of moisture.

Melvin silt loam (0 to 3 percent slopes) (Ma).—This poorly drained, gray soil of the bottom lands has developed from recent general alluvium that contains a high proportion of materials of limestone origin. The soil occupies nearly level areas on first bottoms that are subject to periodic overflow. It is closely associated with the better drained Huntington and Lindside soils that were derived from similar materials. It occurs mainly in long narrow areas. Most of it is in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

Profile description:

Surface soil—
0 to 6 inches, grayish-brown to dark grayish-brown friable silt loam; faintly mottled.
Subsoil—
6 to 16 inches, mottled gray, brown, and yellow friable heavy silt loam or silty clay loam; weak medium blocky structure; contains a few small black concretions.
16 to 32 inches +, light-gray silty clay or silty clay loam with a few brown and yellow mottles; firm when dry but plastic when wet; contains many small, hard, brown concretions; limestone bedrock at depths of 4 to 15 feet.

In places there are a few small angular chert fragments in the surface soil and many in the lower layers. The chert fragments occur where the alluvium that gave rise to the soil washed chiefly from cherty limestone materials. These chert fragments do not much alter the use or management of the soil.

The soil is slightly acid, medium to low in organic matter, and medium in plant nutrients. Permeability is moderate in the surface soil and slow in the subsoil. The soil is waterlogged part of the time. It is not subject to erosion, but applied plant nutrients leach out rapidly. Because of the high water table, the moisture-supplying capacity is high. Workability is poor, and tillage is frequently delayed by wetness.

Use suitability (group 19).—Most of this soil has been cleared, but because of poor drainage, little of it is now used for cultivated crops. Most of it is used for pasture or hay. Yields of corn are uncertain, and frequently the crop fails entirely. The soil is unsuited to alfalfa, but it is suited to redtop and other water-tolerant grasses. Pasture on this soil is especially valuable in periods of dry weather when upland pasture is poor. Artificial drainage, where feasible, should increase the productivity of the soil. Its use suitability, however, would still be limited by the risk of flooding.

Mines, pits, and dumps (1 to 60 percent slopes).—This miscellaneous land type consists of mines and open pits from which limestone rock, gravel, or manganese ore have been removed. Some of these pits are now in operation. The material designated as dumps consists largely of waste from these operations. All of this rough material is not suited to crops and pasture. In some places it is bare rock and in others it is a loose mixture of clayey material and rock fragments. In a few places the materials are predominantly clay and silt that have been washed down on the bottom lands. Even these areas are not suited to plant growth. Most of this land type is in the Tellico-Alcoa-Neubert and the Fullerton-Clarksville-Greendale soil associations. Mines, pits, and dumps are shown on the map by standard symbols. For a discussion of use and management, see group 20 in the section on use and management of soils.

Minvale silt loam, undulating phase (2 to 5 percent slopes) (Mg).—This well-drained soil has formed on old colluvium and local alluvium that have washed from uplands underlain mainly by cherty limestone. The soil has developed under hardwoods, chiefly of oak and hickory. It occurs mainly in small areas on gentle slopes at the bases of steeper upland slopes from which its parent material has washed. It is closely associated with the Fullerton and the Clarksville soils of the uplands, and with the Greendale soils along intermittent drainageways. In many ways, it is similar to the Fullerton soils of the uplands. Most of it is in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

Profile description:

Surface soil—
0 to 8 inches, brown to dark-brown very friable silt loam; weak fine crumb structure; in undisturbed areas the surface soil is stained dark gray to depths of 1 or 2 inches.
8 to 16 inches, yellowish-brown to yellowish-red friable heavy silt loam; weak medium blocky structure.
Subsoil—
16 to 40 inches, yellowish-red friable silty clay loam; moderate medium blocky structure; below a depth of about 28 inches the structure is strong medium blocky; structure units have a shiny coating.
Underlying material—
40 inches +, reddish-yellow or yellowish-red friable silty clay or silty clay loam splotched with olive yellow; limestone or shale bedrock at depths of 5 to 20 feet.

A few angular chert fragments are scattered throughout the profile, and a few hard black concretions, or buckshot, are in the layers lower in the profile. In a total of about 52 acres, there are enough chert fragments to make the soil cherty.

The soil is medium to strongly acid, low to moderate in organic matter, and medium in fertility. Permeability is moderate, and the moisture-supplying capacity is moderate to high. Workability is excellent.

Use suitability (group 5).—This soil is mostly in cutover timber. It is deficient in lime for some crops and deficient in plant nutrients for best yields of most crops. It responds well to manure and to all the common fertilizers.

This soil is well suited to pasture and to many different cultivated crops. If adequately fertilized and limed, it is well suited to the more desirable grasses and to alfalfa and other legumes.

Minvale silt loam, eroded undulating phase (2 to 5 percent slopes) (Me).—This soil differs from Minvale silt loam, undulating phase, chiefly in being moderately eroded. Most of the plow layer consists of remnants of the original surface soil mixed with subsoil material. Because erosion is not uniform, the present surface soil is variable in color, thickness, and texture. This soil occurs on gentle slopes at the bases of steeper upland slopes occupied by Fullerton and, in a few places, by Clarksville soils. Most of it is in

the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

To a depth of about 5 inches the present surface soil is brown to yellowish-brown friable silt loam or heavy silt loam. Underneath, to a depth of about 12 inches, there is a yellowish-red friable heavy silt loam. The subsoil consists of a yellowish-red friable silty clay loam. Small areas occur where all of the original surface soil has been washed away, and there the plow layer is a yellowish-red friable silty clay loam. In most areas a few shallow and a few deep gullies have formed.

As mapped this soil includes a total of 70 acres of Minvale cherty silt loam, eroded undulating phase, and 7 acres of Hermitage cherty silt loam, eroded undulating phase.

Minvale silt loam, eroded undulating phase, is medium to strongly acid, low in organic matter, and medium in fertility. Permeability is moderate, and the moisture-supplying capacity is moderate to high. Workability is very good and productivity is medium.

Use suitability (group 5).—All of this soil is used for pasture or cultivated crops, mainly corn, cotton, small grains, and hay. It is suited to many different crops. The soil is well suited to row crops if they are grown in a rotation planned to control soil losses. It is also well suited to pasture and to the more exacting legumes and other hay crops.

Minvale silt loam, rolling phase (5 to 12 percent slopes) (Mf).—This soil is similar to Minvale silt loam, undulating phase, in profile characteristics. It differs chiefly in having stronger slopes, slightly thinner surface soil and subsoil layers, and somewhat less depth to bedrock. This soil occurs in widely separated areas throughout the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

The soil is low to moderately low in organic matter, medium to strongly acid, and moderately low in plant nutrients. Permeability is moderate. The moisture-supplying capacity and the risk of erosion are also moderate. Workability is good.

Use suitability (group 10).—This soil is almost all in cutover timber. If cleared it is suited to all the common crops grown in the county. It is not well suited to intensive use for row crops, mainly because it is susceptible to erosion. Row crops, however, can be grown in a rotation. The soil is well suited to pasture and hay. It responds well to the common fertilizers. It is deficient in lime.

Minvale silt loam, eroded rolling phase (5 to 12 percent slopes) (Md).—This soil differs from Minvale silt loam, undulating phase, chiefly in having stronger slopes and in being moderately eroded. It further differs in having thinner surface soil and subsoil layers and somewhat shallower depth to bedrock. It consists of areas that were formerly Minvale silt loam, rolling phase, and have lost part of their original surface soil through erosion. This soil is associated mostly with the Fullerton and Clarksville soils. It is mainly in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

The plow layer is a brown to yellowish-brown friable silt loam or heavy silt loam. In small areas where erosion has been more severe and has removed most of the surface soil, the plow layer consists of a yellowish-red friable silt loam or silty clay loam. In some places a few shallow gullies and a few deep gullies have developed.

This soil is medium to strongly acid and low in organic matter and fertility. The moisture-supplying capacity is moderate, and workability is good. The soil is moderately susceptible to further erosion.

Use suitability (group 10).—All of this soil is used for the crops common to the area. A small part is in pasture, and a still smaller part is idle. This soil is poorly suited to intensive use for row crops, but row crops can be grown in a rotation of moderate length. The soil is moderately well suited to pasture and hay. Corn, cotton, tobacco, small grains, and many other crops can be grown, including alfalfa and other more exacting legumes.

Minvale cherty silt loam, rolling phase (5 to 12 percent slopes) (Mc).—This well-drained soil has formed from old colluvium and local alluvium that were derived from uplands underlain chiefly by cherty limestone. Most of these materials have washed from Fullerton soils.

This soil differs from Minvale silt loam, undulating phase, mainly in having steeper slopes, shallower depth to bedrock, and enough chert fragments to interfere with cultivation. It is associated with Fullerton and Clarksville soils and with other Minvale soils. Most of it is in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

To a depth of about 7 inches, the surface soil is a brown to dark-brown very friable cherty silt loam. Underneath, to a depth of about 14 inches, the surface soil is a yellowish-brown to yellowish-red, friable, heavy cherty silt loam. The subsoil extends to a depth of about 36 inches and consists of a reddish-yellow friable cherty silty clay loam. Underneath, the soil material consists of splotched yellow and gray friable cherty silty clay or cherty silty clay loam. Bedrock lies at depths of 4 to 15 feet.

This mapping unit includes about 15 acres of Hermitage cherty silt loam, rolling phase.

Minvale cherty silt loam, rolling phase, is medium to strongly acid and low in organic matter and fertility. Permeability and the moisture-supplying capacity are moderate. The risk of erosion is also moderate. Workability is good.

Use suitability (group 11).—All of this soil is in cutover timber. If cleared the soil would be moderately well suited to all the crops commonly grown in the county. It is not suited to intensive use for row crops, but row crops can be grown in a rotation designed to control the loss of soil through erosion. Although the soil is cherty, it is not droughty. If adequately fertilized and otherwise suitably managed, it can produce good yields of the common crops. If properly treated, alfalfa can be grown successfully. The soil is well suited to pasture.

Minvale cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Mb).—This soil differs from Minvale silt loam, undulating phase, in containing chert, in having stronger slopes, and in having lost part of its original surface soil through erosion. Because of erosion the present surface soil varies much in color,

texture, and thickness. This soil is associated with Fullerton and Clarksville soils and with other Minvale soils. Most of it is in the Fullerton-Clarksville-Greendale and the Dewey-Fullerton-Emory soil associations.

Most of the plow layer consists of remnants of the original surface soil mixed with subsoil material. In some small areas the plow layer consists entirely of original surface soil, but in others the subsoil is exposed through erosion. In many areas there are a few shallow gullies and some deep gullies.

To a depth of about 5 inches, the present surface soil is brown to yellowish-brown friable cherty silt loam or heavy cherty silt loam. Underneath, to a depth of about 12 inches, is a yellowish-red friable heavy cherty silt loam. In the severely eroded spots, the surface soil is yellowish-red, friable, heavy cherty silt loam or friable cherty silty clay loam. The subsoil and the underlying material are similar to those of Minvale cherty silt loam, rolling phase.

This mapping unit includes about 114 acres of Hermitage cherty silt loam, eroded rolling phase. This included soil is somewhat more productive than Minvale cherty silt loam, eroded rolling phase.

Minvale cherty silt loam, eroded rolling phase, has a moderate moisture-supplying capacity. The soil is deficient in lime and plant nutrients, but it responds well to fertilizer and lime. It is low in organic matter, but this can be corrected by applying barnyard or green manure. Workability is good. The risk of erosion is moderate.

Use suitability (group 11).—All of Minvale cherty silt loam, eroded rolling phase, is used for pasture and crops. Corn, cotton, small grains, and many other crops, as well as lespedeza, alfalfa, and other hay crops are grown. The soil is poorly suited to intensive use for row crops because of the risk of erosion. Row crops, however, can be grown well in a moderately long rotation that consists mainly of close-growing crops. If the soil is adequately limed and fertilized, the more exacting grasses and legumes can be grown successfully. In some areas, chert may interfere to some extent with the use of mowing machines. The soil is moderately well suited to pasture.

Monongahela silt loam, undulating phase (2 to 5 percent slopes) (Mh).—This is a moderately well drained, light-colored soil on low to high stream terraces. Most of these terraces lie 5 to 15 feet above the adjacent flood plains. The old general alluvium from which the soil was derived consists of materials formed mainly from sandstone and shale, but in places it contains some limestone materials. This soil is widely distributed but occurs mainly in the shale valleys. Most of it is in the Litz-Sequoia-Cotaco and the Montevallo-Apison-Cotaco soil associations.

Profile description:

Surface soil—
0 to 6 inches, pale-brown friable silt loam or loam; weak fine crumb structure.
6 to 10 inches, light yellowish-brown friable silt loam; weak fine crumb structure.

Subsoil—
10 to 22 inches, brownish-yellow to yellow friable silty clay loam; plastic when wet; weak medium blocky structure.

Pan layer—
22 to 32 inches, distinctly mottled light-gray, yellow, and reddish-yellow friable silty clay loam; compact in place; weak medium blocky structure.
32 inches +, prominently mottled light-gray, yellow, and reddish-yellow silty clay loam; compact in place but friable when removed; bedrock, in most places shale is at depths of 4 to 15 feet.

The layers of the profile vary somewhat in thickness. In many places the texture of the surface soil is loam and the profile has a higher content of sand throughout. In many places below a depth of about 30 inches the profile is clay loam.

This soil includes about 176 acres of Monongahela silt loam, eroded undulating phase. This inclusion differs in having lost part of its original surface soil through erosion. The plow layer is mostly a mixture of original surface soil and subsoil material. This layer consists of pale-yellow to brownish-yellow friable silt loam or heavy silt loam. A few small areas are severely eroded, and in these the plow layer is a brownish-yellow friable to firm silty clay loam. A few shallow gullies and a few deep gullies occur in some areas. The subsoil and pan layer of this inclusion are similar to those of the uneroded undulating phase.

Monongahela silt loam, undulating phase, is strongly acid, and the fertility and content of organic matter are low. Internal drainage is slow, but the surface soil is friable and absorbs moisture well. Permeability of the subsoil is slow. The rather shallow depth to clayey material causes some areas to be fairly droughty during the driest part of the growing season. In most places, however, the soil has a moderate moisture-supplying capacity. Workability is very good. The soil is slightly to moderately erodible.

Use suitability (group 6).—Most of this soil has been cropped. At present the main crops are corn, small grains, and lespedeza. Pasture occupies much of the acreage; a small acreage is idle. Some fertilizer is used for corn, small grains, and tobacco; lime has been applied to much of the soil. This soil is suitable for tilled crops, but its low fertility and slow internal drainage limit the crops that can be grown. Generally small grains and hay are among the better suited crops, but on the lower lying areas, even small grains are injured by winterkilling. Soybeans and corn are among the more productive crops. For much of the soil, tobacco is not well suited, and alfalfa and potatoes are poorly suited. Among the grasses and legumes, timothy, bluegrass, lespedeza, and red clover are suitable, but for good stands and high yields the soil needs to be heavily fertilized and limed. Under proper management bluegrass and whiteclover make productive pasture.

Montevallo shaly silt loam, rolling phase (5 to 12 percent slopes) (Ms).—This light-colored, excessively drained soil on uplands has formed under hardwoods, mainly of oak and hickory. Its parent material consists of residuum weathered from light yellowish-brown or brownish-yellow acid shale and gray acid sandstone. The soil occupies large areas in shale valleys and on ridges. It is associated with Lehew, Apison, and Cotaco soils and with other Montevallo soils. Most of it is in the Montevallo-Apison-Cotaco and the Lehew-Montevallo-Cotaco soil associations.

Profile description:

Surface soil—
0 to 5 inches, pale-yellow to dark yellowish-brown friable shaly silt loam; weak medium granular structure; in undisturbed areas the top inch is dark grayish brown and contains a moderate quantity of organic matter.
Subsurface layer—
5 to 10 inches, brownish-yellow to dark yellowish-brown friable heavy shaly silt loam to shaly silty clay loam; weak coarse granular structure.
Parent material—
10 inches +, brownish-yellow friable silt loam mixed with shale fragments; reddish-yellow coating on many of the shale pieces; bedrock at depths of only ½ to 1½ feet.

The depth of the surface soil varies greatly within short distances. In some places the underlying bedrock is brown or olive-green shale with beds of reddish-brown sandstone.

The soil is strongly acid, low in organic matter, and very low in fertility. Permeability is moderate, but shallowness to bedrock limits the amount of water the soil can absorb and hold. The moisture-supplying capacity is therefore low. Plant nutrients are rapidly leached from the soil, and good fertility is hard to build up and to maintain. Workability is fair.

Use suitability (group 16).—Practically all of this soil is in cutover timber that consists of a mixture of oaks, some shortleaf and loblolly pines, and a few cedars. The soil is poor for cultivated crops and only fair for pasture. Because it is droughty, the soil is poor for crops that mature late in the growing season. For this reason, it is better suited to cotton than to corn. If adequately fertilized, fair yields of small grains, cotton, and lespedeza, redtop, and certain other hay crops can be obtained. The soil can produce fair pasture, but because it is droughty, the grazing period is greatly limited. In most areas the soil can be used better for pasture than for crops. On many farms its best use is for timber production.

Montevallo shaly silt loam, eroded rolling phase (5 to 12 percent slopes) (Mo).—This soil differs from Montevallo shaly silt loam, rolling phase, in having lost part of its original surface soil through erosion. Shallow gullies are common. Some areas have uncrossable gullies that are difficult to control.

For the most part this soil occupies narrow ridge crests, and hilly or steep Montevallo soils are on the adjacent slopes. Most of it is in the Montevallo-Apison-Cotaco and the Lehew-Montevallo-Cotaco soil associations.

The present surface soil, a pale-yellow to dark yellowish-brown friable shaly silt loam or shaly silty clay loam, is about 5 inches thick. The thickness, however, ranges considerably. The subsurface layer is a mixture of friable silt loam and shale fragments. The depth of the profile to bedrock varies greatly within short distances.

The soil is medium to strongly acid and very low in organic matter and fertility. Permeability is moderate, but the moisture-supplying capacity is low. The soil is moderately susceptible to further erosion. It is difficult to build up, and its fertility is difficult to maintain. Workability is fair.

Use suitability (group 16).—All of this soil has been cleared, and some is used for crops and pasture. A large part is in unimproved pasture, and much of the acreage is idle. Cultivated areas are used for corn, cotton, small grains, and hay. Mainly lespedeza and other less exacting legumes are grown. Generally pasture is very poor and contains a high proportion of broomsedge. The soil is poor for crops. If cultivated, long rotations that consist mainly of close-growing crops are needed. Fair yields of small grains, cotton, lespedeza, and redtop can be obtained, if the soil is adequately fertilized. The soil is best suited to pasture, but its carrying capacity is normally only fair.

Montevallo shaly silt loam, eroded undulating phase (2 to 5 percent slopes) (Mp).—This soil differs from Montevallo silt loam, rolling phase, in occupying gentler slopes and in having lost considerable soil through erosion. In most areas there are occasional shallow gullies. Much of this soil occurs in widely separated areas in the Montevallo-Apison-Cotaco and the Lehew-Montevallo-Cotaco soil associations.

The present surface soil, a pale-yellow to dark yellowish-brown friable shaly silt loam or shaly silty clay loam, is about 5 inches thick. In places the plow layer is almost entirely shale material. The subsurface layer consists of a mixture of friable brownish-yellow silt loam and shale fragments. This layer varies in color and in the quantity of shale fragments it contains.

About 43 acres of this soil has not been affected by erosion. In wooded areas there is a 1-inch surface layer that contains much organic matter.

Montevallo shaly silt loam, eroded undulating phase, is medium to strongly acid and very low in organic matter and fertility. Permeability is moderate. The moisture-supplying capacity is low. The risk of further erosion is slight to moderate. Workability is good.

Use suitability (group 16).—Most of this soil has been cleared and is used for crops and pasture. Cotton, corn, small grains, and hay—mainly lespedeza—are the chief crops. The soil is suited to pasture. If the soil is adequately limed and fertilized, fair pasture can be established. Because of the low moisture-supplying capacity, pasture plants dry up rather quickly in dry periods. The soil is only fair for crops, because it is droughty and has very low fertility. If it is adequately fertilized, the yields of cotton, small grains, lespedeza, and redtop are fair. Corn and other late-maturing crops are less well suited.

Montevallo shaly silt loam, hilly phase (12 to 25 percent slopes) (Mr).—This soil differs from Montevallo shaly silt loam, rolling phase, mainly because it is on steeper slopes and has slightly thinner profile layers. In undisturbed areas the top inch of the surface soil contains much organic matter, but there is little below this depth. As mapped, the soil includes a total of 34 acres that is steep (25 to 60 percent slopes). This soil occurs in large areas, and most of it is on slopes of shale ridges. The greatest acreage is in the Montevallo-Apison-Cotaco and the Lehew-Montevallo-Cotaco soil associations.

This soil is medium to strongly acid and is very low in fertility. Because of rapid runoff and shallowness to porous bedrock, the moisture-supplying capacity is

low. If the soil is cleared and used for crops, workability is fair.

Use suitability (group 18).—Practically all of this soil is in cutover timber that consists of a mixture of oaks and shortleaf and loblolly pines. Most of the timber has a low market value. The soil is poor for crops. It is best for pasture. Because it is droughty and very low in fertility, the soil generally can support pasture of only medium or low carrying capacity. The soil is poor for alfalfa and other exacting legumes and grasses.

Montevallo shaly silt loam, eroded hilly phase (12 to 25 percent slopes) (Mn).—This soil differs from Montevallo silt loam, rolling phase, in having steeper slopes and considerable sheet erosion. Associated with this soil are Apison and Cotaco soils and other Montevallo soils.

Much of the plow layer consists of very shaly material, and bedrock shale is generally at depths of ½ to 1½ feet. In places shale outcrops occur. The texture of the plow layer ranges from shaly silt loam to shaly silty clay loam. Gullies that cannot be crossed with farm machinery are common.

The soil is very low in organic matter and fertility and is strongly acid. Permeability is moderate throughout, but the water-supplying capacity is low. Runoff is rapid, and the risk of further erosion is high. Workability is poor.

Use suitability (group 18).—All of this soil has been cleared. A large part is in unimproved pasture, and a large part is idle. Some of the soil is cropped, mainly to corn, cotton, and lespedeza. Because the soil is low in fertility, shallow to bedrock, and hilly, it is poor for crops and pasture. On many farms it can be used best for timber. If pasture acreage is needed, lime and an adequate amount of fertilizer may produce fair grazing.

Montevallo and Muskingum soils, rolling phases (5 to 12 percent slopes) (Ml).—This undifferentiated mapping unit is made up of Montevallo and Muskingum soils on shale and sandstone ridges. These soils are excessively drained. The Montevallo soil has formed from material weathered in place from acid shale and sandstone, and the Muskingum soil has formed from material weathered in place from acid sandstone. The Montevallo soil is shaly, whereas the Muskingum soil is practically free of shale. In a total of about 19 acres, these soils have been moderately eroded. These soils occur along the western side of the county in the Montevallo-Muskingum-Jefferson-Barbourville soil association.

Profile description:

Montevallo shaly silt loam, hilly phase:
- Surface soil—
  - 0 to 6 inches, pale-yellow to dark yellowish-brown friable shaly silt loam.
- Subsurface layer—
  - 6 to 11 inches, brownish-yellow to dark yellowish-brown friable heavy shaly silt loam or shaly silty clay loam.
- Parent material—
  - 11 inches +, mixture of brownish-yellow friable silt loam and shale fragments.

Muskingum fine sandy loam, rolling phase:
- Surface soil—
  - 0 to 6 inches, light yellowish-brown very friable fine sandy loam.
- Subsurface layer—
  - 6 to 16 inches, yellowish-brown very friable heavy fine sandy loam to strong-brown friable clay loam.
- Parent material—
  - 16 inches +, partly decomposed acid sandstone.

The layers of the profiles vary a great deal in thickness. The soils range considerably in depth to bedrock. The depth of the Montevallo soil ranges from ½ to 1½ feet, and depth of the Muskingum soil, from 1 to 3 feet.

These soils are medium to strongly acid, low in organic matter, and very low in fertility. Permeability is moderate, and the moisture-supplying capacity is low. Workability is fair. The risk of erosion is moderate.

Use suitability (group 16).—Most of this mapping unit is forested. The soils have about the same use suitability as Montevallo shaly silt loam, rolling phase.

Montevallo and Muskingum soils, hilly phases (12 to 25 percent slopes) (Mk).—This undifferentiated mapping unit is made up of Montevallo and Muskingum soils. These soils are similar to Montevallo and Muskingum soils, rolling phases, in profile characteristics. They differ chiefly in having stronger slopes and normally slightly thinner surface soil layers. A total of about 211 acres has been moderately eroded.

These soils are strongly acid, low in organic matter, and very low in fertility. Permeability is moderate. The moisture-supplying capacity is low. Workability is fair. The risk of erosion is high.

Use suitability (group 20).—Most of this mapping unit is forested, although some of it is in pasture or idle. The soils have practically the same use suitability as Montevallo shaly silt loam, hilly phase.

Montevallo and Muskingum soils, steep phases (25 to 60 percent slopes) (Mm).—This undifferentiated mapping unit is made up of Montevallo and Muskingum soils. These soils have profiles similar to those of Montevallo and Muskingum soils, rolling phases, but the layers are generally thinner. These soils are shallow to very shallow, generally less than 1½ feet deep to bedrock. They occur on the slopes of shale and sandstone ridges. A total of about 141 acres has been moderately eroded.

These soils are strongly acid, low in organic matter, and very low in fertility. Permeability is moderate. The moisture-supplying capacity is low. The risk of erosion is very high. Workability is very poor.

Use suitability (group 20).—Practically all of this mapping unit is forested. Because these soils have steep slopes, are highly erodible, and are very low in fertility, they are poor for tilled crops. In most places they can be used best for growing trees.

Mullins silt loam (0 to 2 percent slopes) (Mt).—This is a light-colored, poorly drained soil on nearly level uplands. It has formed from material weathered in place from acid shale, or interbedded acid shale and sandstone. The native vegetation was largely water-tolerant oaks. The soil occurs generally in small areas and is associated with Apison soils. The greatest acreage is in the southern part of the county.

Profile description:

- Surface soil—
  - 0 to 7 inches, light brownish-gray to light yellowish-brown very friable silt loam.

Subsoil—
7 to 25 inches, mottled light-gray and yellowish-brown friable silt loam; with depth, gradual transition to firm silty clay loam; many hard black concretions about the size of buckshot.
Pan layer—
25 inches +, mottled light-gray, yellowish-brown, and reddish-yellow very compact silty clay; moderate medium blocky structure; many large brown and black concretions; bedrock at depths of 2 to 3½ feet.

The soil is medium to strongly acid and low in organic matter and plant nutrients. Permeability is moderate in the surface soil and very slow in the subsoil. The moisture-supplying capacity is moderate. Because runoff and the permeability of the subsoil are very slow, the soil is waterlogged during periods of high rainfall. The surface soil and subsoil are free of gravel, chert, and other rock fragments. Workability is poor. Control of erosion is not a problem, because the surface is nearly level. The soil is low in productivity, and it is difficult to increase or to maintain the content of plant nutrients.

Use suitability (group 19).—Much of this soil is in timber, mostly of low market value. If cleared, the soil is largely used for pasture or is idle. Some of it is used for crops, but the soil is poorly suited. If feasible, artificial drainage would broaden the use suitability of the soil, but its use would be limited to corn, soybeans, sorghums, and other annual crops that mature in summer. The soil is best suited to pasture, but, chiefly because of its low fertility and poor drainage, pasture yields are only fair.

Muse silt loam, undulating phase (2 to 5 percent slopes) (My).—This well-drained soil has formed from old colluvial and local alluvial deposits that consist of materials washed from uplands underlain chiefly by shale. The soil has formed under hardwoods, chiefly oak and hickory. It occupies toe slopes or lower hillside positions at the bases of steeper slopes from which its parent material washed. Most of it is in the Montevallo-Apison-Cotaco and the Lehew-Montevallo-Cotaco soil associations.

Profile description:

Surface soil—
0 to 8 inches, light yellowish-brown to yellowish-brown friable silt loam.
Subsoil—
8 to 20 inches, yellowish-brown, grading to strong brown or yellowish red, friable silty clay loam; moderate fine blocky structure.
20 to 40 inches, yellowish-brown to strong-brown, mottled with yellowish red, firm silty clay; gray mottles in the lower part; moderate medium blocky structure.
Underlying material—
40 inches +, mottled gray, yellowish-red, and strong-brown friable silty clay loam; moderate medium blocky structure; bedrock shale or limestone at depths of 5 to 15 feet.

The color of the subsoil varies. In some places it is predominantly brownish yellow to strong brown, and in others it has a reddish-yellow to reddish-brown tinge. On areas in the vicinity of White Oak Mountain, there are varying quantities of chert or sandstone fragments, but these fragments do not interfere materially with cultivation.

The soil is strongly to very strongly acid, low in organic matter, and medium in fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate to high. If cultivated, the soil is slightly to moderately susceptible to erosion. Workability is excellent. For high yields of most crops, the soil is deficient in plant nutrients.

Use suitability (group 5).—Most of this soil is in cutover timber. It is moderately well suited to crops or pasture. Many different crops can be grown. If the soil is adequately limed and fertilized, the more desirable grasses and exacting legumes also can be grown. Row crops can be planted in a moderately short rotation, because the slopes are favorable and control of runoff water is not difficult.

Muse silt loam, eroded undulating phase (2 to 5 percent slopes) (Mw).—This soil consists of Muse silt loam, undulating phase, that has been moderately eroded. It occurs principally in small areas. It occupies toe slopes or lower hillside positions at the bases of steeper slopes from which its parent material was washed. Most of it is in the Montevallo-Apison-Cotaco and the Lehew-Montevallo-Cotaco soil associations.

The surface soil consists mostly of remnants of the original surface soil mixed with subsoil material. A few shallow gullies have formed in some areas. The present surface soil, a yellowish-brown friable silt loam or heavy silt loam, is about 5 inches thick. In the more severely eroded spots, the surface soil is friable silty clay loam.

The soil is strongly to very strongly acid, low in organic matter, and medium in fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate to high, and the risk of further erosion is slight to moderate. Workability is very good.

Use suitability (group 5).—All of this soil is used for crops and pasture, to which it is moderately well suited. Corn, cotton, small grains, and hay are the chief crops. Many different crops can be grown, and, if the fertility level is raised by lime and fertilizer, the more desirable grasses and legumes also can be grown.

Muse silt loam, rolling phase (5 to 12 percent slopes) (Mx).—This soil differs from Muse silt loam, undulating phase, principally in that it occupies stronger slopes. It has somewhat thinner surface soil and subsoil layers and less depth to bedrock, and in a few places the profile contains an appreciable quantity of sand. This soil occurs mostly in the Montevallo-Apison-Cotaco and the Lehew-Montevallo-Cotaco soil associations.

The soil is strongly to very strongly acid and low to moderate in organic matter. It is medium in fertility, but it responds well to lime and fertilizer. The moisture-supplying capacity is moderate to high. The soil is generally free of chert, stones, and gravel, but, in places, it contains small quantities of chert or sandstone fragments. Workability is very good. The soil is only moderately susceptible to erosion.

Use suitability (group 10).—Practically all of this soil is in cutover timber. It is moderately well suited to pasture and fairly well suited to crops. Lime and fertilizer are needed in large amounts for good yields. Many different crops can be grown, but the soil is not so well suited to alfalfa and the more exacting grasses

as are well-drained soils of limestone origin. Rotations of moderate length are needed to keep the soil fertile and to control soil losses.

Muse silt loam, eroded rolling phase (5 to 12 percent slopes) (Mv).—This somewhat excessively drained soil differs from Muse silt loam, undulating phase, in having stronger slopes and shallower depth, as well as in having lost part of its original surface soil through erosion. The degree of erosion is highly variable, but in most places the plow layer, a yellowish-brown friable silt loam or heavy silt loam, consists of remnants of the original surface soil mixed with subsoil materials. In places small severely eroded areas occur. They have a yellowish-brown to yellowish-red friable silty clay loam plow layer.

As mapped, this soil includes about 114 acres of sandier soil. The surface layer of this included soil is dominantly yellowish-red friable fine sandy loam. The subsoil is yellowish-red to red friable sandy clay loam.

Muse silt loam, eroded rolling phase, is low in organic matter, medium in fertility, and strongly to very strongly acid. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate. Workability is good. In places some angular sandstone fragments are present, but they are not sufficient to interfere materially with tillage. Runoff is medium. The risk of further erosion is moderate.

Use suitability (group 10).—Most of this soil is used for crops and pasture, to which it is fairly well suited. A small acreage is idle. Many different crops can be grown, but lime and fertilizer are needed for good yields. The soil is not particularly well suited to alfalfa, but fair yields can be obtained if the soil is heavily limed and fertilized and otherwise well managed. It is better suited to small grains and cotton than to corn and other late-maturing crops.

Muse silt loam, eroded hilly phase (12 to 25 percent slopes) (Mu).—This soil differs from Muse silt loam, undulating phase, chiefly in being hilly and moderately eroded, in containing more sand, and in having somewhat shallower depth to bedrock.

The surface soil, a brown very friable loam or silt loam, is about 5 inches thick. In the upper 8 inches the subsoil is strong-brown friable clay loam and in the lower part, which is about 25 inches thick, it is strong-brown, grading to yellowish red, friable sandy clay loam. In about 61 acres there is very little or no erosion.

The soil is strongly acid to very strongly acid and low in organic matter and fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate. Risk of erosion is moderate to high. Workability is only fair.

Use suitability (group 15).—Nearly all of this soil is used for crops and pasture. It is somewhat less productive of some crops than Muse silt loam, eroded rolling phase, and control of erosion is a somewhat greater problem.

Neubert loam (0 to 5 percent slopes) (Na).—This moderately well drained reddish soil consists of local alluvial and colluvial materials. These parent materials were washed chiefly from Tellico soils that originally were derived from weathered products of calcareous sandstone or shaly sandstone. The relief is nearly level to gently sloping. Practically all of this soil lies in narrow strips along intermittent drainageways in limestone valleys. It occurs in the Tellico-Alcoa-Neubert soil association.

Profile description:

Surface soil—
0 to 15 inches, reddish-brown to dark reddish-brown friable loam; weak medium crumb structure.
Subsurface layer—
15 to 36 inches +, reddish-brown to dark-red friable clay loam; slightly plastic when wet; weak fine granular structure; bedrock occurs at depths of 3 to 12 feet.

The texture of the surface soil varies. In some places it is fine sandy loam, and in others it is silt loam. The texture of the subsurface layer also varies considerably. In some places, below a depth of about 24 inches, the soil is mottled reddish brown, olive yellow, and gray.

The soil is moderately high in organic matter, medium in fertility, and medium to strongly acid. Permeability is moderately rapid in the surface soil and moderate in the subsurface layer. The moisture-supplying capacity is high. Most of the time the rather thick surface soil is moist. During heavy rains some of the soil is temporarily flooded. Crops, however, are not damaged much or too frequently by flooding. Workability is excellent, and the range of moisture content suitable for tillage is wide. The risk of erosion is slight to moderate.

Use suitability (group 3).—A large part of this soil is cropped. The only areas still under forest are in the extreme upper reaches of the drainageways in the steeper parts of the Tellico soil areas. Corn and hay are the principal crops (fig. 4). Small grains and tobacco are grown to a small extent. Some fertilizer is used.

Because of its smooth surface, excellent tilth, large supply of moisture, and ability to respond if fertilized, this soil is good for cultivation. If adequately fertilized, it can be used intensively for row crops. The better drained areas are suited to vegetables, tobacco, alfalfa, and many other crops. The less well-drained

Figure 4.—**Corn on Neubert loam; forest in background is on Tellico soils.**

areas are not well suited to tobacco, alfalfa, or potatoes. Even on the better drained areas, good stands of alfalfa may not last for many years without reseeding. If adequately fertilized, this soil grows good stands of the more desirable legumes and grasses for pasture, and its favorable supply of moisture makes it valuable for pasture during the drier parts of the grazing period.

Pace silt loam, undulating phase (2 to 5 percent slopes) (Pe).—This is a light-colored, moderately well drained soil. It consists of old colluvium and local alluvium that was washed from the uplands that are underlain chiefly by dolomitic limestone, by cherty dolomitic limestone, and by dolomitic limestone that contains sandy layers. These parent materials were washed from uplands occupied chiefly by Fullerton and Clarksville soils. This soil differs from Greendale silt loam principally in being older and in occupying higher positions on colluvial slopes. It occurs on gently sloping foot slopes. It lies below areas of Fullerton and Clarksville soils and above the strips of Greendale soils that lie along intermittent drainageways. This soil is widely distributed, but most of it occurs in the Fullerton-Clarksville-Greendale soil association. Some is in the Dewey-Fullerton-Emory soil association.

Profile description:

Surface soil—
0 to 8 inches, pale-brown to brown very friable silt loam; some chert fragments; weak fine crumb structure.
8 to 18 inches, light yellowish-brown friable silt loam; some chert fragments; weak fine granular structure.
Subsoil—
18 to 26 inches, brownish-yellow to yellowish-brown friable silty clay loam; faint mottling in the lower part; weak fine blocky structure.
Underlying material—
26 to 48 inches +, mottled yellow, gray, and dark-brown, firm, brittle clay loam containing many chert fragments; limestone bedrock at depths of 5 to 12 feet.

Most areas have some chert fragments scattered throughout, but in a total of about 198 acres the soil contains enough chert to make it a cherty silt loam. Also, in places, the texture of the surface soil is somewhat sandy, especially in areas adjacent to Fullerton loam. In these areas, the surface soil is loam or fine sandy loam and the depth to the mottled material is greater than 26 inches in some places.

Pace silt loam, undulating phase, is low in organic matter and fertility and is medium to strongly acid. Permeability is moderate in the surface soil. The subsoil is sufficiently firm to have moderately slow permeability. The moisture-supplying capacity is moderate, and moisture relations generally are favorable. Workability is excellent. The risk of erosion is slight to moderate.

Use suitability (group 6).—This soil is mostly in cutover forest. It is well suited to both crops and pasture. Alfalfa, tobacco, many market vegetables, and many other crops can be grown. The soil can be used for a moderately short rotation if its fertility is kept moderately high, but some care will be required to control erosion. Because of a generally favorable supply of moisture, high yields are possible for practically all the common crops, but substantial amounts of fertilizer and lime are needed. The more desirable legumes and grasses for pasture produce well, but good stands cannot be maintained unless the fertility is brought to a high level.

Pace silt loam, eroded undulating phase (2 to 5 percent slopes) (Pd).—This soil differs from Pace silt loam, undulating phase, chiefly in being moderately eroded. The present surface layer, in most places, consists of about 10 inches of light yellowish-brown friable silt loam. In the more eroded areas the surface layer is friable yellowish-brown silty clay loam and is about 5 inches thick. The subsoil is similar to that of Pace silt loam, undulating phase. In most areas there are a few shallow gullies, and in some areas there are a few deep gullies. In about 159 acres there are enough chert fragments to make the texture a cherty silt loam. Most of this soil is in the Fullerton-Clarksville-Greendale soil association.

This soil is medium to strongly acid, low in fertility, and very low in organic matter. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is good. The risk of erosion is slight to moderate. Workability is very good.

Use suitability (group 6).—Nearly all of this soil is used for crops and pasture, to which it is well suited. Only a small acreage is idle. Corn, cotton, small grains, and hay are the principal crops, but alfalfa, tobacco, many market vegetables, and many other crops can be grown. Lime and much fertilizer are needed for continued high yields of most crops. The fertility level must be raised a great deal before alfalfa can be grown. If well managed, this soil can be used in a moderately short crop rotation.

Pace silt loam, eroded rolling phase (5 to 12 percent slopes) (Pc).—This soil differs from Pace silt loam, undulating phase, chiefly in having stronger slopes and in having lost part of its surface soil through erosion. The 8-inch surface soil in most places consists of light yellowish-brown to brownish-yellow friable silt loam, but in the more eroded areas it is friable silty clay loam. The subsoil is similar to that of Pace silt loam, undulating phase. Bedrock, chiefly limestone, occurs at depths of 4 to 10 feet. This soil is widely distributed in the Fullerton-Clarksville-Greendale soil association.

The soil is medium to strongly acid, low in organic matter, and low in fertility. Permeability is moderate in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate. Workability is good, but tilth is fair to good, depending on the degree of erosion. Where the subsoil material is exposed through erosion or makes up a great part of the plow layer, the supply of moisture is more unfavorable and tilth is poor. Runoff is medium, and the risk of further erosion is moderate.

Use suitability (group 10).—All of this soil has been cropped. More than half is now used for crops, chiefly corn, cotton, and hay. About 25 percent is used for pasture, and the rest is either idle or has reverted to forest. Although the soil is low in fertility, it will respond well to suitable fertilizers. Fertilizer and lime are used to some extent. The soil is moderately well suited to many different crops and to

pasture. Because the surface is sloping and infiltration of moisture is somewhat retarded, moderately long rotations are needed for protection against erosion losses. If well managed, a 4-year rotation is adequate. If it is substantially fertilized and adequately limed, the soil will maintain fairly good stands of legume-grass pasture. This soil is somewhat more droughty than Pace silt loam, undulating phase. In the drier part of the grazing period, pasture plants dry out sooner.

Pace cherty silt loam, rolling phase (5 to 12 percent slopes) (Pb).—This light-colored, well-drained soil has formed on old alluvial and colluvial deposits composed of materials washed mainly from Clarksville and Fullerton soils. The soil has formed under a deciduous forest, chiefly oak and hickory. It occurs in medium-sized areas in association with Clarksville and Fullerton soils of the uplands and with Greendale soils along intermittent drainageways. Most of it is in the Fullerton-Clarksville-Greendale soil association.

Profile description:

Surface soil—
0 to 6 inches, pale-brown to brownish-yellow very friable cherty silt loam; weak fine crumb structure.
6 to 14 inches, light yellowish-brown friable cherty silt loam; weak fine granular structure; in undisturbed areas the surface inch is brown or very dark brown.

Subsoil—
14 to 22 inches, brownish-yellow to yellowish-brown, friable, cherty silty clay loam with faint mottling in the lower part; weak fine blocky structure.

Underlying material—
22 inches +, mottled gray and yellowish-red compact cherty silty clay loam; bedrock, generally limestone, at depths of 4 to 10 feet.

In most places the underlying material is compact enough to be a hardpan or brittlepan. Depth to the pan layer varies somewhat. In some areas this layer is absent. In a total of about 95 acres the soil contains very little or no chert.

The soil is medium to strongly acid and is low in organic matter and fertility. Permeability is moderately rapid in the surface soil, so moisture infiltrates easily. Permeability is moderately slow in the subsoil, so infiltration is somewhat retarded. The moisture-supplying capacity of the soil is moderate. Although there is sufficient chert to interfere materially with cultivation, workability is good. Runoff is medium, and the risk of erosion is moderate.

Use suitability (group 11).—This soil is mostly in cutover deciduous forest. It is fairly well suited to crops and pasture, but substantial amounts of lime and fertilizer are needed for good yields. The soil is suited to most of the common crops, but if it is cleared and cropped, moderately long rotations will be needed to control runoff and loss of soil material.

Pace cherty silt loam, eroded rolling phase (5 to 12 percent slopes) (Pa).—This soil is moderately eroded. The present plow layer consists of remnants of the original surface soil mixed with subsoil material. In some areas there are a few shallow and a few deep gullies. This soil occurs in medium-sized areas in close association with other Pace soils. Most of it is in the Fullerton-Clarksville-Greendale soil association.

The present surface soil, a light yellowish-brown to brownish-yellow friable cherty silt loam, is about 8 inches thick. The subsoil is similar to that of Pace cherty silt loam, rolling phase. In severely eroded areas the surface soil consists of friable cherty silty clay loam of predominantly yellowish brown color. As a rule such areas are small.

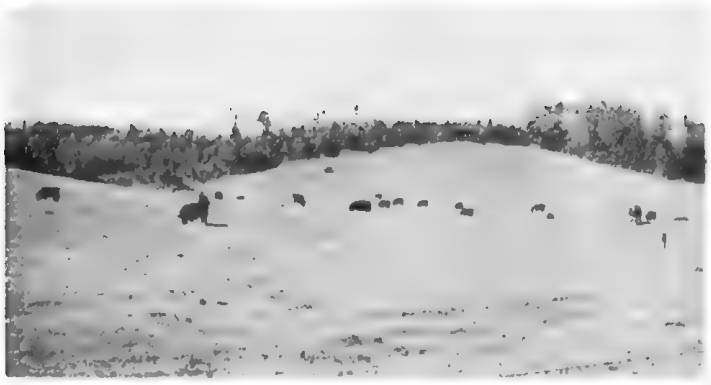

Figure 5.—**Permanent pasture on Pace cherty silt loam, eroded rolling phase. Sod is a mixture of orchardgrass, bluegrass, and whiteclover. Clarksville cherty silt loam, hilly phase, in background.**

This soil is medium to strongly acid, very low in organic matter, and low in fertility. Permeability is moderately rapid in the surface soil and moderately slow in the subsoil. The moisture-supplying capacity is moderate. Runoff is medium, and the risk of further erosion is moderate. Workability is good.

Use suitability (group 11).—All of this soil is used for pasture (fig. 5) and many kinds of crops. The soil is well suited to pasture and is moderately well suited to crops. Substantial quantities of lime and fertilizer are needed for good yields. The soil is suited to most of the common crops, but it is not so well suited to corn and other late-maturing crops as some soils with higher moisture-supplying capacity.

Prader silt loam (0 to 3 percent slopes) (Pr).—This is a poorly drained soil of the bottom lands. It has formed from alluvium that consists mainly of materials of sandstone and shale origin, but in places there is an admixture of materials of limestone origin. The soil has developed on nearly level first bottoms under a vegetation that consists chiefly of water-tolerant oak, willow, and sweetgum. Many areas, especially those along the larger streams, are depressional and occupy old stream channels. In places new alluvial materials are added to the soil by stream overflow. There is considerable seepage from the adjacent upland slopes. Water remains on the surface during much of the year, and the water table is near the surface at all times. The soil occurs in small, widely distributed areas in all the shale valleys. Most of it is in the Litz-Sequoia-Cotaco and Montevallo-Apison-Cotaco soil associations.

Profile description:

Surface soil—
0 to 6 inches, light brownish-gray friable silt loam.

Subsoil—
6 to 18 inches, mottled gray, light brownish-gray, and yellowish-brown friable heavy silt loam or silty clay loam; weak fine granular structure.
18 inches +, mottled gray, light brownish-gray, yellowish-brown, and yellowish-red plastic silty clay or silty clay loam; limestone bedrock at depths of 4 to 15 feet.

The surface soil ranges from 5 to 10 inches in thickness, and in some places its texture is loam. The texture of the lower profile layers varies greatly. In some areas the soil is mottled to the surface, but if it is cultivated, the mottles tend to be destroyed, and this gives the plow layer a uniform color. In many areas, if very dry, the surface layer is gray.

The soil is slightly acid to strongly acid. It has a moderate to low supply of organic matter and is medium to low in fertility. If the soil is not saturated with water, permeability is moderate in the surface soil. Permeability is very slow in the subsoil. Because of the high water table, the development of the root system of many crops is greatly restricted. The moisture-supplying capacity of the soil is high. Plant nutrients are leached rapidly from the soil, and for this reason it is difficult to raise and to maintain the fertility level. Runoff and internal drainage are very slow. Soil erosion is not a problem. Workability is poor because the soil is waterlogged much of the time, but, when dry, the soil has fair tilth.

Use suitability (group 19).—A large part of this soil has been cleared, and a small acreage is cultivated. Most of the cleared areas are used for pasture. Although most of the soil is suited to pasture, in most places pasture is of poor quality. Normally, this soil is not suited to crops, because of its poor drainage. Artificial drainage will improve the soil for both crops and pasture. Overflow is generally a decided hazard to crops and causes pastures to deteriorate by leaving a deposit of fine sediments on them during the grazing period.

Purdy silt loam (0 to 3 percent slopes) (Pg).—This poorly drained soil on high to low stream terraces has formed under a deciduous forest that included many water-tolerant species. The parent material consists of mixed alluvium that originated chiefly from shale and sandstone. In some places the alluvium contains some limestone. The relief is nearly level. This soil is widely distributed in areas near the larger streams.

Profile description:

Surface soil—
0 to 6 inches, light brownish-gray to grayish-brown friable silt loam.
6 to 15 inches, light-gray friable heavy silt loam that contains some yellow mottles.
Subsoil—
15 to 25 inches +, mottled gray and yellow friable heavy silt loam or silty clay loam; compact in place; shale or limestone bedrock at depths of 4 to 12 feet.

The soil is very low in organic matter, low in fertility, and slightly to strongly acid. Permeability is moderate in the surface soil but very slow in the subsoil. Runoff and internal drainage are very slow. There is no risk of erosion. During winter most of the areas are waterlogged or are partly inundated. During the driest parts of the growing season, the soil is droughty. The moisture-supplying capacity is moderate. Workability is fair.

Use suitability (group 19).—Much of this soil has been cleared. Some of it has been cultivated, but at present a great part is used for pasture. Most of the pasture is of poor quality and of low carrying capacity. Corn and lespedeza are the chief crops. Little fertilizer is used. Because it has very poor drainage and is low in fertility, this soil is poor for crops. It can produce some pasture, but to be productive it needs artificial drainage and heavy fertilization. If properly fertilized and limed, some areas, especially those most easily drained, will produce corn, lespedeza, redtop, soybeans, and certain other crops, as well as some legumes and grasses for pasture.

Rockland, limestone (3 to 60 percent slopes) (Ra).—This miscellaneous land type consists predominantly of limestone outcrops and loose limestone fragments. In places the rocks are surrounded by some clayey soil material, but this material is so thin over bedrock or so limited in extent that it does not support sufficient vegetation to be useful as pasture. This land type is associated chiefly with Talbott, Dewey, Decatur, and Farragut soils. It has no value for crops and little value for pasture. Workability is very poor. The forest vegetation consists predominantly of cedars and of short or scrubby deciduous trees. For a discussion of use and management, see group 20 in the section, How to Use and Manage the Soils.

Sequatchie loam, undulating phase (2 to 5 percent slopes) (Sa).—This is a well-drained soil on low stream terraces. The parent material consists of mixed alluvium that was derived chiefly from sandstone and shale, but in many places it contains some material of limestone origin. The soil has formed under hardwoods, mainly oak and hickory. It occurs in small to moderately large areas that are widely distributed along streams. Most of it is in the Cumberland-Etowah-Sequatchie soil association.

Profile description:

Surface soil—
0 to 7 inches, dark-brown very friable loam; weak fine crumb structure.
Subsoil—
7 to 13 inches, dark yellowish-brown to brown friable clay loam; weak medium blocky structure.
13 to 25 inches, strong-brown friable clay loam; plastic when wet; weak medium blocky structure.
25 to 36 inches, yellowish-brown friable to very friable clay loam.
Underlying material—
36 inches +, yellowish-brown friable or very friable loam or sandy clay loam splotched with gray; in some places pebbles, cobblestones, or chert fragments occur in the lower part of the material; bedrock at depths of 5 to 15 feet.

In some areas along the Hiwassee River, there are shiny mica flakes throughout the profile. In places the surface soil is a fine sandy loam and the subsoil is a sandy clay loam that is underlain by a fine sandy loam. About 28 acres of the soil has been moderately eroded.

In most places the soil is medium to strongly acid. It is low to moderate in organic matter and medium in fertility. Permeability is rapid in the surface soil and moderate in the subsoil. The moisture-supplying capacity is high. Most areas are not subject to flooding, but a few are flooded infrequently. Workability is excellent. On the surface and throughout the soil there are a few cobblestones, but they do not interfere with cultivation. Tillage can be carried on within a wide range of moisture content. Surface runoff is very slow to slow, and the risk of erosion is slight.

Use suitability (group 5).—Practically all of this soil has been cleared and cropped, and at present a

very great part is cultivated. Corn and cotton are the common row crops. Small grains and hay crops grow well. Not much soil is idle. Fertilizer is used regularly for tobacco, cotton, and other row crops. Lime has been applied to much of the soil.

Because the soil is smooth, has good permeability and a favorable supply of moisture, and responds well if adequately fertilized, it is one of the best soils in the county for use as cropland. It is suited to tobacco, cotton, market vegetables, alfalfa, and many other crops. It can be used intensively for row crops if the fertility level is maintained. The soil is productive of legumes and grasses for pasture, but it is less suited to these plants than some of the silt loam soils of higher fertility.

Sequoia silt loam, undulating phase (2 to 5 percent slopes) (Sc).—This is a well-drained soil of the shale uplands. It is moderately deep to interbedded limestone and shale or to interbedded acid shale and calcareous shale. The soil has formed under hardwoods from weathered materials of these rocks. The subsoil and underlying layers are yellowish brown to yellowish red. This soil differs from Farragut silty clay loam, eroded undulating phase, in having a lighter colored surface soil, and from Apison silt loam, undulating phase, in having a firmer subsoil. The soil is associated chiefly with Litz soils. In many places it occupies smooth low ridgetops, whereas the Litz soils occupy the adjacent stronger slopes. Most of it is in the Litz-Sequoia-Cotaco, the Sequoia-Talbott-Colbert, and the Sequoia-Farragut-Hermitage soil associations.

Profile description:

Surface soil—
0 to 6 inches, brown friable silt loam; weak medium crumb structure.
6 to 11 inches, reddish-yellow friable heavy silt loam; weak fine blocky structure.
Subsoil—
11 to 19 inches, reddish-yellow to strong-brown very firm silty clay loam; weak medium blocky structure.
19 to 27 inches, reddish-yellow very firm silty clay loam grading to silty clay; plastic when wet; moderate medium blocky structure.
Parent material—
27 inches +, yellowish-red or reddish-yellow firm silty clay splotched with yellow; very plastic when wet; moderate medium blocky structure; shale bedrock at depths of 2½ to 4 feet.

In undisturbed areas the surface inch is dark grayish-brown because of its high content of organic matter. There are a few outcrops of limestone. A few hard black concretions, about the size of birdshot, occur on the surface and throughout the soil.

This soil is medium to strongly acid, low to moderate in organic matter, and low in fertility. The surface soil has moderate premeability and good tilth. The subsoil has slow permeability, but it affords adequate internal drainage for all crops. The supply of moisture for crops is favorable. The moisture-holding capacity is moderate but less than that of such soils as Emory silt loam and Cotaco silt loam. Runoff is medium, and the risk of erosion is moderate. Workability is very good.

Use suitability (group 8).—Practically all of this soil is in cutover deciduous forest. A smooth surface, favorable tilth, and good response to the proper fertilizer, make this soil well suited to most of the general farm crops, and to alfalfa and tobacco, but less suited to truck crops than some of the more permeable well-drained soils. The soil can be cropped if moderately short rotations are used, but substantial amounts of fertilizer are needed for high yields. Where the fertility is kept at a high level, the soil is suited to practically all of the more desirable legumes and grasses.

Sequoia silt loam, rolling phase (5 to 12 percent slopes) (Sb).—This soil differs from Sequoia silt loam, undulating phase, chiefly in having stronger slopes, and, in most places, a thinner surface soil and shallower depth to bedrock. Leached or acid shale bedrock is at depths of 2 to 2½ feet. A few shale fragments are in the subsoil. The areas of the soil are small, and most of them are in the Litz-Sequoia-Cotaco, the Sequoia-Talbott-Colbert, and the Sequoia-Farragut-Hermitage soil associations.

This soil is medium to strongly acid, low to medium in organic matter, and low in fertility. The surface soil is permeable and has good tilth, but the subsoil greatly retards percolation of moisture, although roots of most plants penetrate it fairly well. The moisture-supplying capacity is moderate. Workability is good.

Use suitability (group 12).—Practically all of this soil is in cutover deciduous forest. It is suited to pasture and to most of the general farm crops. Nevertheless, because the soil has strong slopes and is shallow to the heavy subsoil, it is not suited to intensive use for row crops or for market vegetables. Moderately long rotations, chiefly of small grains and legumes and grasses for hay, can well be used. If the soil is properly managed, it responds well to fertilizer and lime. It is capable of supporting good stands of legume-grass pasture, but its limited moisture-holding capacity makes the soil droughty during the drier parts of the growing season. The soil is moderately to highly susceptible to erosion, and the control of erosion is an important part of its management.

Sequoia silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Sf).—This is a moderately well drained soil of the shale uplands. It occupies a great part of the broader ridgetops, where the slopes are eroded rolling Litz and Sequoia soils. The soil differs from Sequoia silt loam, undulating phase, chiefly in having lost a moderate part of its surface soil by erosion. The present 5-inch plow layer consists of a yellowish-brown to reddish-yellow friable silty clay loam or heavy silt loam. The subsoil is similar to that of Sequoia silt loam, undulating phase. Bedrock occurs at depths of 2 to 3½ feet. The areas are widely distributed throughout the Sequoia-Farragut-Hermitage, the Litz-Sequoia-Cotaco, and the Sequoia-Talbott-Colbert soil associations.

This soil is medium to strongly acid and low in organic matter and fertility. Permeability is moderately slow in the surface soil and slow in the subsoil. The plow layer has fairly good tilth, but its silty clay loam texture gives it somewhat less favorable tilth than that of Sequoia silt loam, undulating phase. The moisture-supplying capacity is moderate. The soil is moderately susceptible to erosion, but soil losses are

easily checked, if a moderately long rotation is used. Workability is good.

Use suitability (group 8).—All of this soil has been cropped at some time. Much of it is now used for crops, chiefly corn, cotton, small grains, and hay. Lespedeza, red clover, and alfalfa are the common hay crops. The soil is suited to practically all the general farm crops and to tobacco. It is not particularly well suited to truck crops, chiefly because it has less favorable tilth than some of the more loamy soils and because it loses water more slowly. If properly fertilized, the soil can be kept at a high level of productivity under a moderately long rotation consisting of a row crop, a small grain, and 1 or 2 years of legume-grass hay. Some fertilizer is applied to row crops and small grains, and generally both fertilizer and lime are heavily applied to alfalfa. Generally, if properly fertilized, the soil supports good stands of the more desirable legumes and grasses for pasture. The pastures can be maintained without great difficulty.

Sequoia silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Se).—This is a somewhat excessively drained soil of the shale uplands. It differs from Sequoia silt loam, undulating phase, chiefly in having stronger slopes, in being eroded, and generally in having a shallower depth to bedrock, which lies at depths of 1½ to 2 feet. This soil occupies large areas on the slopes of the low ridges in the Litz-Sequoia-Cotaco, the Sequoia-Talbott-Colbert and the Sequoia-Farragut-Hermitage soil associations.

The 4-inch plow layer is a yellowish-brown to reddish-yellow friable silty clay loam. The subsoil ranges from about 10 to 19 inches in thickness. The upper part of the subsoil consists of a reddish-yellow to strong-brown very firm silty clay loam. The lower part of the subsoil consists of reddish-yellow very firm silty clay loam that grades into silty clay as the depth increases. The parent material is a mottled reddish-yellow, and gray very firm silty clay that contains variable quantities of partly decomposed shale fragments. On the more exposed parts of the slopes, there are patches where all of the surface soil has been removed through erosion. In these places the plow layer consists of a reddish-yellow firm silty clay. In most areas a few shallow gullies, and in some areas a few deep gullies, have developed.

The soil is medium to strongly acid and low in organic matter and fertility. Permeability is moderately slow in the surface soil and slow in the subsoil. Tilth is somewhat unfavorable, and in the more eroded patches it is very unfavorable. The firm subsoil retards the infiltration of moisture and this, together with the moderately strong slopes, causes runoff to develop quickly during rains. The moisture-supplying capacity is low. Workability is only fair. The risk of further erosion is moderate to high.

Use suitability (group 12).—All of this soil has been cropped at some time. Corn, cotton, small grains, and hay are the chief crops. Oats and barley are the principal small grains. Crimson clover is the chief legume, and alfalfa is next in importance. About 25 percent of this soil is used for pasture, and much of the rest is idle. Some fertilizer is used for the row crops and small grains, and lime has been applied to much of the acreage. The soil is suited to most of the general field crops, but its strong slopes and slow subsoil permeability make it unsuited to intensive use or to truck crops in general. If properly managed and adequately fertilized, it can be made more productive of small grains and alfalfa and other of the more desirable legumes and grasses. Because the soil is droughty the growth of crops that need a long growing season is greatly limited and pasture vegetation stops growing early during the drier parts of the grazing period.

Sequoia silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Sd)—This soil is similar to Sequoia silt loam, rolling phase, but erosion has removed its original surface soil and, in places, part of its subsoil. Much of it occurs in small narrow strips on the slopes of the low ridges occupied by smoother Sequoia soils. Most of it is in the Litz-Sequoia-Cotaco soil association.

The 4-inch plow layer consists of reddish-yellow very firm silty clay to silty clay loam. Below this is mainly parent soil material consisting of variegated or mottled reddish-yellow, yellow, and gray very firm silty clay. Bedrock lies at depths of ½ to 1½ feet, but outcrops occur in some places. In the more sloping parts shallow gullies are common, but most of them can be filled by deep tillage. A few deep gullies are present.

The soil is medium to strongly acid and is very low in organic matter and fertility. Permeability is slow throughout. Moisture infiltrates very slowly. The moisture-supplying capacity is very low, and the soil is very droughty. Runoff is rapid, and, if cultivated, the soil is highly susceptible to further erosion. It can be worked only within a narrow range of moisture content. Workability is poor.

Use suitability (group 16).—All of this soil has been cropped at some time. Much of it is now idle. Some is used for unimproved pasture, and a very small part is cropped.

Not much fertilizer is used. This soil is poor for crops because of unfavorable tilth, poor moisture relations, and great susceptibility to erosion. Properly fertilized and seeded, it can produce fair pasture, but grazing is greatly restricted because the soil is droughty. The soil can be improved for plant growth by deep plowing so as to disrupt the shaly material, but this requires heavy machinery that would be expensive to use. In most areas the soil is better for pasture than for crops.

Staser silt loam (0 to 3 percent slopes) (Sh).—This well-drained soil of the bottom lands has developed from alluvium that was derived chiefly from sandstone and shale materials, with which some limestone material has been mixed. The soil is nearly level, and practically all of it is subject to overflow. This soil occurs in long narrow areas along the larger drainageways in close association with Hamblen and Prader soils on first bottoms. It is widely distributed, but most of it is in the Litz-Sequoia-Cotaco, the Montevallo-Apison-Cotaco, and the Cumberland-Etowah-Sequatchie soil associations.

Profile description:

Surface soil—
0 to 15 inches, brown to dark-brown very friable silt loam; weak medium crumb structure.
Subsurface layer—
15 to 40 inches +, yellowish-brown to dark yellowish-brown very friable heavy silt loam; weak medium blocky structure; grades to alluvial material that is mottled gray, brown, and yellow in most places; bedrock occurs at depths of 4 to 15 feet.

The surface soil ranges from 8 to 20 inches in thickness. In a few areas the soil has a reddish cast and the subsurface layer is reddish brown. Areas along the Hiwassee River contain much alluvium that was washed from highly micaceous soils in mountains east of Bradley County. In these areas shiny mica flakes occur throughout the soil.

The soil is strongly acid to nearly neutral. It has a moderate content of organic matter and is high in fertility. Most of the soil has very good tilth and moderate permeability. The moisture-supplying capacity is very high. Normally the soil has a good supply of moisture throughout much of the drier part of the year. Because the soil is easily flooded, fieldwork is frequently delayed in spring. The soil has good workability, and there is practically no erosion problem.

Use suitability (group 1).—Because this soil is nearly level, fertile, and in good tilth, it is well suited to intensive use for row crops. Corn and soybeans are among the better suited row crops. Some areas are productive of cotton and tobacco, but the risk of flooding must be taken into account in growing high-value crops. All of the legumes and grasses more desirable for hay and pasture are very productive without intensive management, but stands of alfalfa cannot be expected to survive the floods. This soil is especially desirable for pasture, because its high fertility and favorable supply of moisture keep plants growing through much of the drier part of the grazing period.

Staser loam (0 to 3 percent slopes) (Sg).—This well-drained soil of bottom lands has formed from alluvium derived chiefly from sandstone and shale materials. In places these materials contain some limestone. This soil differs from Staser silt loam in having coarser texture in the surface soil and in having more sand throughout the profile. It is level or nearly level and is subject to overflow from the adjacent streams.

The surface soil, 8 to 12 inches thick, consists of a brown to dark-brown very friable loam. The subsurface layer, 24 to 32 inches thick, is a yellowish-brown to dark yellowish-brown very friable sandy clay loam or clay loam. Below this is a friable alluvial material, mottled with gray and yellow. In some areas in the vicinity of the White Oak Mountain many sandstone fragments are mixed throughout the soil.

The soil is strongly acid to nearly neutral, contains a moderate quantity of organic matter, and is high in fertility. Permeability is moderately rapid. The moisture-supplying capacity is very high. Workability is very good, although tillage occasionally has to be postponed because of excessive moisture.

Use suitability (group 1).—Practically all of this soil is used for all the common crops. The soil is highly suitable for crops and pasture. It is well suited to the intensive production of most row crops. Because the soil is subject to flooding, however, its use suitability is somewhat limited. For this reason some areas are not well suited to small grains, alfalfa, or tobacco or other high-value crops. Corn and soybeans are among the better suited row crops.

Stony rolling and hilly land, limestone (5 to 25 percent slopes) (Sk).—This miscellaneous land type consists largely of limestone outcrops and loose rocks that are so abundant as to prohibit feasible tillage. It contains enough soil material to support an appreciable growth of grass. Locally the areas are known as limestone rockland or glady land. The limestone fragments and outcrops occupy about 10 to 50 percent of the surface. Between the rocks the material is similar to that of the Talbott or Colbert soils. This land type is associated with Talbott and Colbert soils in the limestone valleys. As mapped it includes a total of about 8 acres that is undulating (2 to 5 percent slopes), and a total of about 53 acres that is steep (25 to 60 percent slopes).

The soil material of Stony rolling and hilly land, limestone, is relatively high in fertility and is medium to strongly acid. The land type has unfavorable tilth, and infiltration of moisture is slow. The clayey soil material and its shallowness to bedrock greatly limit the moisture-holding capacity of this land type. Workability is very poor.

Use suitability (group 17).—Most of this land type is now used for permanent pasture. Stoniness makes it poor for crops, although some patches can be tilled with hand implements. Most of the areas support a good stand of bluegrass and whiteclover, but the stand can be improved by adding lime and some fertilizer. The limited moisture-holding capacity of this land type causes most of the soil material to be droughty during the drier parts of the grazing season. Nevertheless, this land type is best used for pasture.

Talbott silty clay loam, eroded undulating phase (2 to 5 percent slopes) (Tb).—This well-drained soil of limestone valleys has a notably firm subsoil. It has formed from material weathered in place from clayey limestone. The surface soil is similar to that of Dewey silty clay loam, eroded undulating phase, but the subsoil is firmer and more clayey, and depth of the soil to bedrock is generally considerably less. For the most part the plow layer now consists of remnants of the original silt loam surface soil mixed with subsoil material. This is one of the least extensive soils of the uplands. It lies as narrow bodies along the east side of some of the limestone valleys. Most of it is in the Talbott-Colbert-Stony land and the Sequoia-Talbott-Colbert soil associations.

Profile description:

Surface soil—
0 to 5 inches, brown to dark-brown firm silty clay loam; weak fine granular structure.
Subsoil—
5 to 18 inches, yellowish-red firm silty clay loam grading to silty clay; very plastic when wet; moderate medium blocky structure.
18 to 26 inches, reddish-brown very firm silty clay; very plastic when wet; moderate medium blocky structure.

Parent material—
26 inches +, yellowish-red tough silty clay mottled with yellow and gray; very plastic when wet; bedrock generally lies at depths of 2½ to 8 feet, but in a few places it occurs as outcrops.

In the least eroded parts the surface soil is a brown friable silt loam. In small scattered areas the surface soil is a yellowish-red or dark reddish-brown silty clay loam. In some places yellow and gray mottles occur in the lower part of the subsoil.

The soil is medium to strongly acid, low in organic matter, and medium in fertility. Permeability is moderate in the surface soil but slow in the subsoil. The moisture-supplying capacity is moderate. Runoff is medium. The risk of erosion is moderate. Workability is good, but the soil cannot be worked over a wide range of moisture content.

Use suitability (group 8).—Practically all of this soil has been cropped. Corn, cotton, small grains, and hay (chiefly lespedeza) are grown. The rest is used mainly for pasture. The soil is well suited to many of the general farm crops, especially small grains and the legumes and grasses more desirable for hay. It is less well suited to market vegetables, especially potatoes and other root crops. The heavy, firm consistence of the subsoil makes it more difficult to cultivate these crops and does not permit ample root development.

Commercial fertilizers are used for corn, cotton, and small grains and are applied fairly heavily where alfalfa is grown. If properly fertilized and seeded, the soil will grow good stands of alfalfa, orchardgrass, whiteclover, bluegrass, and other desirable plants. The limited moisture-supplying capacity makes the shallower areas rather droughty during the drier parts of the growing season.

Talbott silty clay loam, eroded rolling phase (5 to 12 percent slopes) (Ta).—This is a somewhat excessively drained soil of the uplands. It differs from Talbott silty clay loam, eroded undulating phase, chiefly in having stronger slopes, more rapid runoff, and shallower depth to bedrock. This soil occurs in association with other Talbott soils in limestone valleys. Most of it is in the Talbott-Colbert-Stony land and the Sequoia-Talbott-Colbert soil associations.

The 5-inch plow layer is dark-brown to reddish-brown firm silty clay loam. The subsoil is about 17 inches in thickness. The upper part of the subsoil consists of a yellowish-red firm silty clay loam grading to silty clay. The lower part consists of reddish-brown very firm silty clay. In a total of about 9 acres the soil is uneroded, and the surface soil consists of brown friable silt loam. In places the soil has been eroded to the degree that the subsoil is exposed and the plow layer is a yellowish-red firm silty clay that is plastic when wet. In some areas short gullies are common, but most of them are very shallow and can be fairly easily filled by tillage. In most places limestone bedrock occurs at depths of 2 to 6 feet.

The soil is medium to strongly acid, low in organic matter, and medium in fertility. Its shallow depth to the clayey subsoil causes slow infiltration of moisture; consequently, runoff accumulates quickly during rains. Much of the soil is droughty and has somewhat unfavorable tilth. Workability is fair. The range in moisture content favorable for plowing is narrow, and the more eroded parts are only fairly easy to cultivate, even if the supply of moisture is favorable.

Use suitability (group 12).—All of this soil has been cropped at some time. Corn, small grains, and hay (chiefly lespedeza) occupy approximately half of the acreage. The rest is nearly all in pasture. The soil is suited to most of the general farm crops, but moderately strong slopes and slow infiltration of moisture make it highly susceptible to erosion. Moderately long rotations, consisting chiefly of small grains and legume-grass hay with row crops at infrequent intervals, are suitable.

Some fertilizer is used for row crops and small grains, and much of the acreage has been limed. If adequately fertilized and limed, alfalfa and the more desirable grasses and legumes develop good stands. Crop yields and the carrying capacity of pasture, however, are limited by the moderate to low moisture-supplying capacity. The effects of low moisture are especially evident during the drier parts of the growing season.

Talbott silty clay, severely eroded rolling phase (5 to 12 percent slopes) (Tc).—This somewhat excessively drained soil has lost practically all or all of its original silt loam surface soil and, in places, part of its subsoil. It differs from Talbott silty clay loam, eroded undulating phase, principally in having stronger slopes, more rapid runoff, and, because of more severe erosion, a finer textured and more clayey plow layer. The individual areas of this soil are small. Most of them are intricately associated with other Talbott soils in the Talbott-Colbert-Stony land and the Sequoia-Talbott-Colbert soil associations.

The 5-inch plow layer consists of reddish-brown firm to very firm silty clay. Below this is 10 inches or more of mottled yellowish-red, yellow, and gray very firm silty clay. Limestone bedrock lies at depths of 1½ to 5 feet. Small gullies are common, but most of them can be crossed with heavy machinery.

The soil is medium to strongly acid, very low in organic matter, and low in fertility. The clayiness of the entire soil greatly retards infiltration of water and causes rapid runoff. The moisture-supplying capacity is low, and the soil is very droughty. The risk of further erosion is high, and unless protected, cultivated areas are quickly denuded of loose material by the rapid runoff. Workability is poor.

Use suitability (group 14).—All of this soil has been cropped at some time. A small part is now cropped, but most of the soil is either in unimproved pasture or is idle. Low moisture-supplying capacity, poor tilth, and high susceptibility to further erosion make this soil poor for crops. Little fertilizer is used. If properly fertilized and seeded, the soil is capable of supporting a good stand of the legumes and grasses more desirable for pasture. The lack of moisture-supplying capacity limits the carrying capacity of pasture and stops plant growth early in the dry periods.

Tellico fine sandy loam, eroded rolling phase (5 to 12 percent slopes) (Tg).—This well-drained soil has formed from material weathered in place from calcareous sandstone. It has lost a notable part of its original surface soil through erosion. The present

plow layer consists of remnants of the original surface soil mixed with subsoil material. Practically all of this soil is on smooth ridgetops. Other Tellico and Litz soils occupy the adjacent hilly and steep slopes. This soil is widely distributed throughout the Tellico-Alcoa-Neubert soil association.

Profile description:

Surface soil (plow layer)—
0 to 5 inches, dark reddish-brown friable fine sandy loam.
Subsoil—
5 to 20 inches, dark reddish-brown friable clay loam or silty clay loam.
Parent material—
20 to 36 inches +, dark reddish-brown firm sandy clay or sandy clay loam; color grades to reddish brown or red with depth; bedrock of calcareous sandstone at depths of 3 to 7 feet.

The profile layers vary considerably in thickness. In areas totaling about 4 acres the soil has been severely eroded. These small areas occur on the more exposed parts of the slopes. They have lost all of their original surface soil, and the plow layer is subsoil material of dark reddish-brown friable clay loam or silty clay loam. In a total of about 23 acres the soil has lost very little or none of its surface soil through erosion.

Tellico fine sandy loam, eroded rolling phase, is medium to strongly acid and low in organic matter and fertility. Permeability is rapid in the surface soil and moderate in the subsoil. The moisture-supplying capacity is moderate. Tilth is generally good, but it varies somewhat, depending on the quantity of subsoil material in the plow layer. Most of the soil can be cultivated within a relatively wide range of moisture content. Runoff is medium and the risk of further erosion is moderate. Workability is good.

Use suitability (group 10).—Practically all of this soil has been cropped at some time. Corn, cotton, lespedeza, and pasture now occupy a great part. Most of the row crops are fertilized to some extent.

Favorable tilth and ability to warm early in spring make this soil well suited to winter legumes and market vegetables, especially to root crops and to early vegetables. The soil is suited to corn, small grains, and other general farm crops, and to the more desirable legumes and grasses for hay and pasture. It requires rotations of moderate length. Some care is needed to control erosion.

Tellico fine sandy loam, eroded hilly phase (12 to 25 percent slopes) (Tf).—This somewhat excessively drained soil differs from Tellico fine sandy loam, eroded rolling phase, mainly in having stronger slopes and somewhat less depth to bedrock. It has lost a considerable part of its original surface soil through erosion. In most places the plow layer now consists of remnants of the original surface soil mixed with subsoil material. This soil is widely distributed throughout the Tellico-Alcoa-Neubert soil association.

The 5-inch plow layer consists of dark reddish-brown friable fine sandy loam to clay loam. The subsoil, 7 to 18 inches in thickness, consists of a dark reddish-brown friable clay loam or silty clay loam. Calcareous sandstone bedrock occurs at depths of 2 to 6 feet. In a total of about 32 acres the soil is uneroded or has been only slightly eroded. In patches on the more exposed parts of the slopes, the soil has lost all of its original surface soil and the plow layer now is a dark reddish-brown friable clay loam or silty clay loam.

The soil is medium to strongly acid and low in organic matter and fertility. Permeability is rapid in the surface soil and moderate in the subsoil. The moisture-supplying capacity is moderate. The soil tends to be droughty, but it is less droughty on the north-facing slopes than on the south-facing slopes. Workability is fair. The soil can be cultivated within a fairly wide range of moisture content. The strong slopes cause runoff to develop rapidly during rains. The soil is highly susceptible to further erosion.

Use suitability (group 15).—All of this soil has been cropped at some time. At present it is used to some extent for corn, cotton, small grains, and hay. A large part is in permanent pasture. One small part is idle, and another has reverted to pine forest. The soil is suited to many different crops, but it requires long rotations to protect the strong slopes and to keep the soil productive. Some fertilizer is used. Under average conditions small grains and the legumes and grasses more desirable for hay and pasture are among the better suited crops. Practically all of the row crops produce well, but they can be grown only at infrequent intervals.

Tellico fine sandy loam, steep phase (25 to 60 percent slopes) (Tk).—This is a somewhat excessively drained shallow to deep soil. Its depth to bedrock of calcareous sandstone ranges from 1 to 3 feet. Outcrops of rock are common. This soil is widely distributed throughout the Tellico-Alcoa-Neubert soil association.

The surface soil is a dusky-red friable fine sandy loam to loam. Although the soil ranges from 5 to 10 inches in thickness, normally it is about 6 inches thick. The subsoil, a dark reddish-brown friable clay loam or silty clay loam, is about 12 inches thick, but it ranges from 5 to 20 inches in thickness. The parent material, a dark reddish-brown firm sandy clay or sandy clay loam, is 4 inches or more in thickness. The color grades to reddish brown or red as the depth increases.

The soil is medium to strongly acid, moderate in organic matter, and low in fertility. Permeability is rapid in the surface soil and moderate in the subsoil. The moisture-supplying capacity is low. The south-facing slopes are fairly droughty, but the north-facing slopes are less so and have a somewhat better supply of moisture (fig. 6). If cleared, the soil is highly erodible. It has poor workability.

Use suitability (group 20).—Nearly all of this soil is in cutover forest, mainly deciduous trees. In places, pines are intermixed with the other trees. Because of strong slopes, nearness of bedrock to the surface, and high erodibility, this soil is poor for crops and pasture. Areas needed for pasture must be heavily fertilized and otherwise well managed to protect the soil against erosion.

Tellico fine sandy loam, eroded steep phase (25 to 60 percent slopes) (Th).—This soil differs from Tellico fine sandy loam, steep phase, in being moderately sheet

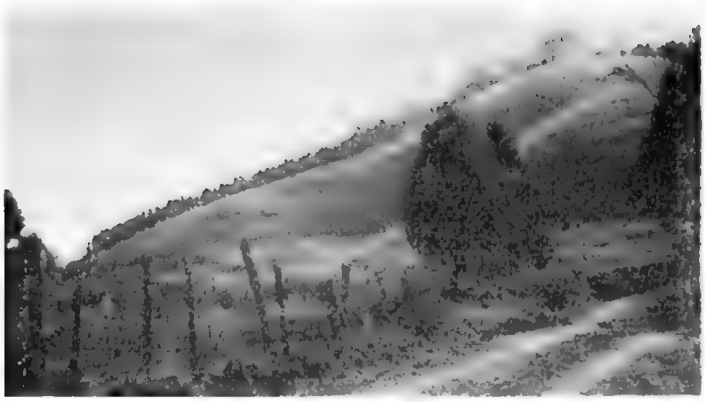

Figure 6.—**Tellico fine sandy loam on a characteristic steep, smoothly rounded slope.**

eroded. Shallow gullies are common, but deep gullies are less common. This soil occurs in the Tellico-Alcoa-Neubert soil association.

The eroded surface soil is about 5 inches thick, but it ranges from 3 to 6 inches in thickness. It consists of dark reddish-brown friable fine sandy loam to clay loam. The subsoil averages about 7 inches in thickness, but the range is from 3 to 15 inches. It is dark reddish-brown friable clay loam or silty clay loam.

This soil is medium to strongly acid and low in organic matter and fertility. Permeability is rapid in the surface soil and moderate in the subsoil. The moisture-supplying capacity is low. The risk of further erosion is high. Workability is poor.

Use suitability (group 20).—All of this soil has been used for crops and pasture. Most of it is now in unimproved pasture. Some areas are idle. Because of its steep slopes, low fertility, erodibility, and droughtiness, the soil is not suited to crops or pasture. It is best for timber.

Tellico clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Td).—This somewhat excessively drained soil has formed from material weathered in place from calcareous sandstone. Erosion has removed all or practically all of its original fine sandy loam surface soil and, in places, part of its subsoil. The plow layer consists almost entirely of subsoil material. It is a dark reddish-brown friable clay loam or silty clay loam that ranges from 3 to 7 inches in thickness. Below this material is a dark reddish-brown to red firm sandy clay or sandy clay loam that is 6 inches or more in thickness. Bedrock of calcareous sandstone occurs at depths of 1 to 4 feet. There are some rock outcrops, especially along the lower slopes. Gullies are common, and some of them are deep. The areas of this soil are on slopes leading down from high ridges in the Tellico-Alcoa-Neubert soil association.

The soil is medium to strongly acid, very low in organic matter, and low in fertility. It has poor tilth, but permeability is moderate throughout. The moisture-supplying capacity is low. Workability is poor. The risk of further erosion is high.

Use suitability (group 17).—All of this soil has been cropped at some time. About half is now used for unimproved pasture, some areas are idle, and much of it has reverted to pine forest. A small part is used for corn, lespedeza, and small grains. Because the soil has strong slopes, unfavorable moisture content, and poor tilth, it is poor for tilled crops. Not much fertilizer is used. If properly fertilized and seeded, most of the soil can be made to produce fairly good pasture, but, because the soil is droughty, its carrying capacity is limited.

Tellico clay loam, severely eroded steep phase (25 to 60 percent slopes) (Te).—This soil differs from Tellico clay loam, severely eroded hilly phase, chiefly in having stronger slopes and, in some places, a somewhat shallower depth. Much of the original fine sandy loam surface soil has been lost. The plow layer is composed almost entirely of subsoil material. It consists of dark reddish-brown friable clay loam or silty clay loam that is 3 to 6 inches thick. Below this is 6 inches or more of dark reddish-brown to red firm sandy clay or sandy clay loam. Bedrock of calcareous sandstone is at depths of 1 to 3 feet, but in places outcrops are common. In most areas there are frequent shallow gullies and some deep gullies. This soil is widely distributed throughout the Tellico-Alcoa-Neubert soil association.

The soil is medium to strongly acid, very low in organic matter, and low in fertility. It has poor tilth, but permeability is moderate throughout. The moisture-supplying capacity is low, but the northerly slopes are somewhat less droughty than the southerly slopes. Workability is very poor, and risk of further erosion is very high.

Use suitability (group 20).—All of this soil has been cropped at some time. Much has reverted to pine, and most of the rest is used for unimproved pasture or is idle. The strong slopes, poor tilth, and very high erodibility make this soil poor for crops or pasture. Very little or no fertilizer is used. Areas that must be used for pasture require heavy fertilization, some lime, proper seeding, and other good management to avoid further damage through erosion.

Tellico silt loam, eroded rolling phase (5 to 12 percent slopes) (Tl).—This well-drained soil has formed from material weathered in place from calcareous sandstone and beds of shale. In most places the soil is underlain by acid shale because the sandstone beds have weathered away. Most of this soil has been moderately eroded. The plow layer consists mostly of remnants of the original surface soil mixed with subsoil material.

This soil occurs mostly in narrow irregular strips on the top of fairly high ridges. The slopes extending downward from the ridges are occupied by hilly Tellico soils. Most of the soil is in the Tellico-Alcoa-Neubert soil association.

Profile description:

Surface soil (plow layer)—
0 to 5 inches, dark reddish-brown friable silt loam to silty clay loam; weak medium crumb structure.

Subsoil—
5 to 20 inches, dark reddish-brown friable silty clay loam; weak medium blocky structure.

Parent material—
20 to 36 inches +, dark reddish-brown firm silty clay or silty clay loam; color grades to reddish-brown or

red as the depth increases; moderate medium blocky structure; bedrock, in most places shale, lies at depths of 3 to 7 feet.

The surface soil varies from 3 to 8 inches in thickness, and the subsoil varies from 10 to 20 inches. In a total of about 38 acres the soil has been severely eroded. In these areas—some of them small spots—the plow layer is composed almost entirely of subsoil material. It consists of 3 to 7 inches of dark reddish-brown friable silty clay loam. In a total of about 3 acres, there is little or no erosion and the surface soil, about 8 inches thick, is dusky-red friable silt loam.

Tellico silt loam, eroded rolling phase, is medium to strongly acid and low in organic matter and fertility. Permeability and moisture-supplying capacity are moderate. Workability is good. The risk of further erosion is moderate.

Use suitability (group 10).—All of this soil has been cleared and used chiefly for crops. All crops common to the area are grown. Some of the soil is in pasture, and much is idle. There are a few manganese ore mines in areas where this soil occurs. The soil is moderately well suited to crops and well suited to pasture. It is particularly well suited to early vegetables because in spring the soil tends to warm up sooner than most soils in the county. The more desirable legumes and grasses do not grow so well on this soil as on some of the soils over limestone. If the soil is properly fertilized, good pasture can be maintained.

Tellico silty clay loam, severely eroded hilly phase (12 to 25 percent slopes) (Tm).—This excessively drained soil of uplands has lost all or nearly all its original silt loam surface soil and, in places, part of its subsoil. It differs from Tellico silt loam, eroded rolling phase, mainly in having stronger slopes, more severe erosion, and generally less depth to bedrock. This soil occurs in fairly large areas. It occupies slopes of high ridges in the Tellico-Alcoa-Neubert soil association.

The plow layer, a dark reddish-brown friable silty clay loam, is about 3 to 7 inches thick. Below this is dark reddish-brown to red firm silty clay or silty clay loam material that is 6 inches or more in thickness. Gullies are common, and many of them are deep. Bedrock lies at depths of 1 to 4 feet. Some rock outcrops occur, especially along the lower slopes.

As mapped this soil includes a total of about 89 acres of Tellico silt loam, eroded hilly phase, which differs mainly in being less eroded; a total of about 23 acres of Tellico silt loam, hilly phase, which differs mainly in having little or no erosion; and a total of about 23 acres of Tellico silt loam, eroded steep phase, which differs chiefly in having steeper slopes, less erosion, and, in places, less depth to bedrock.

Tellico silty clay loam, severely eroded hilly phase, is medium to strongly acid, very low in organic matter, and low in fertility. Permeability is moderate throughout. The moisture-supplying capacity is low. The risk of further erosion is high. Workability is poor.

Use suitability (group 17).—All of this soil is used for crops and pasture. Most of it is now in unimproved pasture or is idle. Some has reverted to pine forest. Because this soil has strong slopes and poor tilth, and is droughty and highly erodible, it is poor for crops. Fair pasture can be grown on areas that have been adequately limed and fertilized. Some areas can be used best for timber.

Tyler silt loam (0 to 3 percent slopes) (Tn).—This is a somewhat poorly drained soil of low fertility that occupies nearly level and depressional areas on the high to low stream terraces. The soil was formed from old general alluvium. This parent material was derived from soils on uplands underlain mainly by sandstone and shale. The soil was formed mainly under a native vegetation of water-tolerant trees. This soil is closely associated with Monongahela and Purdy soils and is intermediate in drainage between them. It is widely distributed along streams in the shale valleys. Most of the areas are small and elongated. In many places the soil lies next to upland slopes, and, most of the time, it is saturated by seepage from the uplands.

Profile description:

Surface soil—
0 to 6 inches, pale-brown to light yellowish-brown very friable silt loam; weak fine crumb structure.
Subsoil—
6 to 10 inches, light yellowish-brown very friable silt loam; weak fine subangular blocky structure.
Pan layer—
10 to 34 inches, gray, firm, heavy silty clay mottled with yellow and brown; compact in place; bedrock at depths of 4 to 12 feet.

The surface soil ranges from 5 to 7 inches in thickness, and the subsoil from 3 to 7 inches.

This soil is medium to very strongly acid and low in organic matter and plant nutrients. Permeability is moderate in the surface soil but slow in the subsoil because of the underlying pan layer. The soil above the pan layer is saturated with water much of the time. The moisture-supplying capacity is moderate. Crops may be injured either by prolonged wet or dry periods. Plant nutrients are rapidly lost from the soil, so a reasonably high level of fertility is difficult to maintain. Workability is good and risk of erosion is slight.

Use suitability (group 7).—Most of this soil is in permanent pasture. Some is cultivated. Corn, hay, and sorghum are grown. The soil is poor for corn, cotton, small grains, alfalfa, and vegetables. Sorghum, soybeans, cowpeas, lespedeza, and grasses are among the crops that are best suited. Artificial drainage would broaden use suitability and increase productivity, but it is difficult to drain the soil adequately because it has a compact pan layer below the subsoil. Pasture is fairly well suited, but its carrying capacity is low.

Waynesboro loam, eroded rolling phase (5 to 12 percent slopes) (Wc).—This well-drained friable soil on high stream terraces has formed over old general alluvium. The alluvium chiefly came from sandstone, shale, and limestone. The soil is on stream terraces that are 30 to 100 feet above the adjacent flood plains. Most of it is in the valley of the Hiwassee River. It is associated with Holston, Etowah, Sequatchie, and Cumberland soils.

Profile description:

Surface soil—
0 to 5 inches, brown to dark-brown very friable heavy loam; weak fine crumb structure.
5 to 12 inches, dark-brown to reddish-brown very friable heavy loam.
Subsoil—
12 to 32 inches, yellowish-red friable clay loam; color grades to red with increasing depth; moderate medium blocky structure.
Underlying material—
32 inches +, red firm to friable cobbly sandy clay showing yellow splotches and streaks; in places, no splotches and streaks are evident above depths of 4 or 5 feet; bedrock of limestone or shale occurs at depths of 3 to 20 feet.

The layers of the profile vary somewhat in thickness. Throughout the surface soil and subsoil there are a few rounded pebbles. A few areas are virtually uneroded. In these areas the 6-inch surface is dark yellowish brown to brown loam. On the more exposed parts of the slopes there are patches where much of the surface layer has been removed, and there the plow layer consists of reddish-yellow or red firm to friable sandy clay loam. In a small part the surface layer, 5 to 8 inches thick, is decidedly light colored, or pale yellow to very pale brown.

As mapped this soil includes a total of about 34 acres of Waynesboro loam, eroded undulating phase, which differs mainly in having gentler slopes (2 to 5 percent). It also includes a total of about 5 acres of Waynesboro loam, undulating phase, which differs mainly in having gentler slopes and little or no erosion.

Waynesboro loam, eroded rolling phase, is medium to strongly acid, moderate in organic matter, and medium in fertility. Permeability is moderate throughout. The moisture-supplying capacity is moderate. Runoff is medium, and the risk of further erosion is moderate. Workability is good.

Use suitability (group 10).—Practically all of this soil has been cropped at some time. Much of it is now used for corn, small grains, lespedeza, alfalfa, tobacco, cotton, and other crops. The soil is well suited to general farm crops and certain truck crops. It is, however, somewhat less desirable for truck crops than some of the more friable soils. The soil has moderately strong slopes and requires fairly long rotations to control erosion. Some fertilizer is used, and lime has been applied to much of the acreage. If the soil is adequately fertilized, the more exacting legumes and grasses will maintain good stands and have a fairly high carrying capacity.

Waynesboro cobbly loam, eroded rolling phase (5 to 12 percent slopes) (Wb).—This well-drained cobbly soil has formed on high stream terraces from old mixed alluvium. This alluvium consists of materials that were derived from sandstone, shale, and limestone. This soil is similar to Waynesboro loam, eroded rolling phase, in most profile characteristics. It differs in having cobblestones on the surface and throughout its depth. These stones interfere with use of some tillage implements and, in some places, may interfere with use of mowing machines. This soil is associated with Cumberland, Etowah, and Holston soils and with other Waynesboro soils. Most of it is near the Hiwassee River in the Cumberland-Etowah-Sequatchie soil association.

Profile description:

Surface soil—
0 to 5 inches, brown to dark-brown very friable cobbly loam.
5 to 12 inches, dark-brown to reddish-brown very friable cobbly loam.
Subsoil—
12 to 32 inches, yellowish-red, grading with depth to red, friable cobbly clay loam; moderate medium blocky structure.
Underlying material—
32 inches +, red to light-red, splotched with yellow, friable cobbly sandy clay; limestone or shale bedrock at depths of 3 to 20 feet.

The surface soil varies somewhat in thickness. In a total of about 9 acres the soil has been severely eroded. In these areas the plow layer consists of reddish-yellow or red firm to friable sandy clay loam that contains variable amounts of cobblestones.

Waynesboro cobbly loam, eroded rolling phase, is medium to strongly acid and contains a moderate quantity of organic matter. It is medium in fertility. Permeability is rapid in the surface soil and moderate in the subsoil. Internal drainage is medium. The moisture-supplying capacity is moderate. Runoff is medium, and the hazard of further erosion is moderate. Workability is fair.

Use suitability (group 10).—All of this soil has been cleared, and most of it is used for crops. Corn, cotton, small grains, and hay are the principal crops. Tobacco occupies a very small acreage. This soil is moderately well suited to many different crops and to pasture. It is suited to most row crops, but moderately long rotations are needed to control soil losses caused by erosion. If the soil is adequately limed and fertilized, it produces good stands of the more exacting legumes and grasses.

Waynesboro cobbly loam, eroded hilly phase (12 to 25 percent slopes) (Wa).—Stronger slopes and somewhat excessive drainage make this soil different from Waynesboro cobbly loam, eroded rolling phase. Most of the areas are more eroded or are shallower to bedrock. In places shallow gullies are common. In some of the areas where the underlying alluvium is several feet thick, a few deep gullies occur. Cobblestones in the soil materially interfere with tillage. Most of the soil is on high stream terraces along the Hiwassee River.

The upper part of the surface soil is brown to dark-brown very friable cobbly loam, about 5 inches thick; the lower part is dark-brown to reddish-brown very friable cobbly loam, 3 to 6 inches thick. The subsoil—a yellowish-red, friable, cobbly clay loam—is 10 to 20 inches thick and becomes red in the lower part. Below this layer is red to light-red, friable, cobbly sandy clay that is splotched with yellow. Bedrock underlies the soil at depths of 2 to 8 feet.

In some places the surface soil is pale yellow and the subsoil is light red to yellow. In a total of about 19 acres, the soil has lost all of its original surface soil through erosion and has a plow layer of reddish-yellow to red, friable to firm, cobbly clay loam. In a total of about 4 acres, the soil is practically free of cobblestones.

Waynesboro cobbly loam, eroded hilly phase, is medium to strongly acid, moderate in content of organic matter, and medium in fertility. Permeability is rapid in the surface soil and moderate in the subsoil. Workability is fair. Tilth varies widely, depending on the quantity of friable surface soil that has been lost through erosion. If erosion has removed practically all the surface soil, tilth is poor. In these areas the supply of moisture is also poor. Runoff is rapid, and the risk of further erosion is moderate to high.

Use suitability (group 15).—This soil is suitable for crops and pasture, but because it has strong slopes and is moderately to highly susceptible to erosion, it requires long rotations and special care to keep a good vegetative cover. If the soil is adequately fertilized and properly seeded, most of it will produce good pasture. The more eroded areas grow much less pasture because of their droughtiness.

Whitwell loam (0 to 3 percent slopes) (Wd).—This somewhat poorly drained to moderately well drained soil of the low stream terraces was derived from alluvium washed from uplands underlain chiefly by shale and sandstone. The soil is level or nearly level. Although it is on low terraces along many of the larger creeks, it is in a somewhat lower position than the associated Sequatchie loam, undulating phase. It is similar to Monongahela silt loam, undulating phase, in some characteristics but differs in having a darker surface soil and a more friable subsoil. This soil occurs in widely separated areas.

Profile description:

Surface soil—
0 to 6 inches, brown to dark-brown very friable loam; weak fine crumb structure.
6 to 12 inches, brown to yellowish-brown friable loam; weak medium blocky structure.

Subsoil—
12 to 22 inches, brownish-yellow friable heavy loam or clay loam; moderate medium blocky structure.
22 to 36 inches, brownish-yellow friable clay loam mottled with strong brown and gray; moderate medium blocky structure.

Underlying material—
36 inches +, mottled light-gray, yellowish-red, and reddish-yellow friable clay loam; weak medium blocky structure; bedrock at depths of 4 to 12 feet.

The layers of the profile vary somewhat in thickness. In many places soft brown and black concretions are present in the subsoil and underlying material.

The soil is medium to strongly acid. It is moderately well supplied with organic matter and is medium in fertility. Permeability is moderate throughout, but at times the water table is within less than 3 feet of the surface and greatly restricts the root zone. The moisture-supplying capacity is high. Workability is good, and the risk of erosion is only slight.

Use suitability (group 7).—Practically all of this soil is used for pasture and crops. Corn, cotton, oats, and hay are the principal crops. The soil is well suited to corn and most hay crops, but it is moderately well suited to other crops and pasture. Its use for most cultivated crops is limited because of somewhat unfavorable drainage. It is poor for alfalfa, tobacco, and truck crops. Because the soil has favorable slopes and is medium in fertility, it can be used intensively for row crops. For continued high yields the soil is deficient in phosphorus and potassium, but it responds well if properly fertilized.

Wolftever silt loam, undulating phase (2 to 5 percent slopes) (We).—This moderately well drained soil on low stream terraces has formed from mixed alluvium that was derived chiefly from limestone. The fairly tight pan layer is a characteristic feature. This soil is associated with soils of the bottom lands along the larger creeks. Some areas occur along the Hiwassee River. Most of the soil is in the Cumberland-Etowah-Sequatchie soil association.

Profile description:

Surface soil—
0 to 8 inches, brown to dark-brown friable silt loam; weak medium crumb structure.

Subsoil—
8 to 16 inches, strong-brown or yellowish-brown friable heavy silt loam or silty clay loam; weak medium blocky structure.

Pan layer—
16 to 32 inches +, strong-brown or yellowish-brown firm silty clay loam; compact in place; moderate fine blocky structure; material crushes into medium granules; bedrock occurs at depths of 4 to 16 feet.

The profile layers vary considerably in thickness. As depth increases, the dominant color of the pan layer grades toward a brownish yellow, mottled with gray and dark brown. The areas along the Hiwassee River contain many mica flakes and have a more friable subsoil. In some places the subsoil consists of compact heavy silt loam.

More than half of this soil has lost part of its original surface soil through erosion. In these eroded places the plow layer consists of remnants of the original surface soil mixed with subsoil material. It is a strong-brown to yellowish-brown, friable, heavy silt loam or silty clay loam. The rest of the profile is similar to that in the uneroded areas. The eroded areas are easily worked, but their tilth is not so favorable as that of the uneroded areas. Runoff is somewhat greater, and erosion is more of a risk.

Wolftever silt loam, undulating phase, is medium to strongly acid, contains a moderate quantity of organic matter, and is medium in fertility. Permeability is moderate in the surface soil and slow in the subsoil. In some places the subsoil is sufficiently firm to be somewhat resistant to roots. The moisture-supplying capacity is moderate. The soil is moderately susceptible to erosion. Workability is good and tilth is very good.

Use suitability (group 6).—Nearly all of this soil has been cultivated. It is now used chiefly for corn, hay, and small grains. Small areas are used for pasture. Some fertilizer is used, and lime has been applied to most of the acreage. The soil is fairly well suited to crops and, if properly managed and fertilized, it can be brought to and kept at a relatively high level of productivity. The soil is suited to many different crops. It is, however, not very well suited to alfalfa, and some of the alfalfa crops fail. If the soil is adequately fertilized and limed, red clover, orchardgrass, bluegrass, white clover, and other crops produce well.

Capability Groups of Soils

Capability classification is a means of showing the comparative suitability of soils for agricultural use. The capability classification of a particular soil depends on the number of uses to which it is suited, its susceptibility to erosion or other damage if cultivated, and the kind and amount of management needed to protect it from erosion and to maintain its productivity.

Eight general capability classes are recognized. Soils in classes I, II, and III are suitable for annual or periodic cultivation. In class I are soils that have the widest range of use. They are level, productive, well-drained, and easy to work. Even if cultivated several times a year, they do not erode readily and will remain productive if managed with normal care. Soils in class II do not have quite so wide a range of suitability as those in class I. Some of the soils in class II are gently sloping and consequently need moderate care to prevent erosion; others may be slightly droughty, or slightly too wet, or somewhat limited in depth. Soils in class III can be cropped regularly, but they have a narrower range of use than those in class II and need still more careful management.

Soils in class IV should be cultivated only occasionally or under very careful management.

Soils in classes V, VI, and VII should not be cultivated but can be used for pasture, range, or forest. Soils in class V are level, but are droughty, wet, or low in fertility, or otherwise unsuitable for cultivation. Soils in class VI are not suitable for crops, because they are steep or droughty or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can be cultivated enough without damage, to allow planting trees or seeding pastures. Soils in class VII provide only poor to fair yields of forage or forest products.

In class VIII are soils that have practically no agricultural use. These areas produce little useful vegetation, but they may constitute attractive scenery; they may form parts of watersheds, or they may provide food and shelter for wildlife. Some areas have been developed into recreational facilities. Mountains, deserts, and sand dunes are examples of class VIII land.

The soils in any one capability class are limited to the same degree, but may be limited for different reasons. To show what characteristic of each soil limits its uses, any one of classes II through VII may be divided into one to four subclasses, each identified by a letter following the capability class number. The letter "e" indicates that the risk of erosion is what limits the uses of the soil; the letter "w" is used if the soil is limited by excess water; the letter "s" shows that the soil is shallow, droughty, or unusually low in fertility; and the letter "c" is used to indicate that the climate is so hazardous that it limits the uses of the soil. Climate is not considered a limiting factor in Bradley County.

Classes and Subclasses in Bradley County

The soils of Bradley County have been placed in capability classes I, II, III, IV, VI, and VII. None of the soils of the County have been placed in classes V or VIII.

The definitions of each class and subclass that follow give the general nature of most, but not all, of the major soils in this county.

Class I.—Soils that are easy to farm and have no more than slight limitations in use. This class has no subclass.

Class II.—Soils that can be used for tilled crops with only moderate conservation problems or limitations.
- IIe: Deep well-drained soils of the undulating uplands and terraces.
- IIs: Cherty colluvial soils.
- IIw: Somewhat poorly drained alluvial and colluvial soils.

Class III.—Soils with one or more serious conservation problems when used for tilled crops.
- IIIe: Deep well-drained soils of the rolling uplands and terraces.
- IIIs: Shallow soils with unfavorable subsoil that has poor moisture-supplying capacity.
- IIIw: Poorly drained alluvial soils.

Class IV.—Soils that have very serious conservation problems when cultivated, and, therefore, require very careful treatment and management.
- IVe: Deep well-drained soils of the hilly uplands and terraces.
- IVs: Shallow soils with unfavorable subsoil that has poor moisture-supplying capacity.
- IVw: Poorly drained soils of the terrace lands.

Class VI.—Soils requiring permanent vegetation, usually long-producing pasture or forage, and having only moderate conservation problems when in such use.
- VIe: Deep soils of the hilly and steep uplands.
- VIs: Shallow droughty soils of the hilly uplands.

Class VII.—Soils usually best suited to trees, with only the more favorable sites suited for limited grazing.
- VIIe: Deep well-drained soils of the steep uplands and gullied land.
- VIIs: Shallow droughty soils of the steep uplands, stony land, and rockland.

The capability class and subclass for each soil in the county is as follows:

Alcoa loam, eroded rolling phase (Aa)	IIIe.
Apison silt loam:	
Undulating phase (Af)	IIe.
Eroded undulating phase (Ac)	IIe.
Rolling phase (Ad)	IIIe.
Eroded rolling phase (Ab)	IIIe.
Severely eroded rolling phase (Ae)	IVe.
Barbourville loam (Ba)	IIe.
Barbourville stony loam (Bb)	VIIs.
Bolton silt loam:	
Eroded hilly phase (Bc)	IVe.
Eroded rolling phase (Bd)	IIIe.
Eroded steep phase (Be)	VIe.
Bruno loamy fine sand (Bf)	IVs.
Capshaw silt loam, undulating phase (Ca)	IIe.

Clarksville cherty silt loam:	
Rolling phase (Ce)	IIIe.
Eroded rolling phase (Cc)	IIIe.
Hilly phase (Cd)	IVe.
Eroded hilly phase (Cb)	IVe.
Steep phase (Cf)	VIIe.
Colbert silty clay:	
Eroded undulating phase (Ch)	IIIs.
Eroded rolling phase (Cg)	IVs.
Conasauga silt loam:	
Undulating phase (Cm)	IIIs.
Eroded undulating phase (Ck)	IIIs.
Level phase (Cl)	IIIs.
Cotaco silt loam (Co)	IIw.
Cotaco loam (Cn)	IIw.
Cumberland silty clay loam:	
Eroded undulating phase (Cr)	IIe.
Eroded rolling phase (Cp)	IIIe.
Severely eroded rolling phase (Ct)	IIIe.
Severely eroded hilly phase (Cs)	IVe.
Dandridge shaly silt loam:	
Hilly phase (Dd)	IVs.
Eroded hilly phase (Da)	IVs.
Eroded rolling phase (Db)	IIIs.
Steep phase (De)	VIIs.
Eroded steep phase (Dc)	VIIs.
Decatur silty clay loam:	
Eroded undulating phase (Dg)	IIe.
Eroded rolling phase (Df)	IIIe.
Dewey silty clay loam:	
Eroded undulating phase (Dk)	IIe.
Eroded rolling phase (Dh)	IIIe.
Dewey silty clay, severely eroded rolling phase (Dl)	IIIe.
Dowellton silty clay loam (Dm)	IIIs.
Emory silt loam (Ea)	IIe.
Etowah silt loam:	
Undulating phase (Ed)	IIe.
Eroded undulating phase (Ec)	IIe.
Eroded rolling phase (Eb)	IIIe.
Farragut silty clay loam:	
Eroded undulating phase (Fc)	IIe.
Eroded rolling phase (Fb)	IIIe.
Farragut silty clay, severely eroded rolling phase (Fa)	IIIe.
Fullerton silt loam:	
Rolling phase (Fu)	IIIe.
Eroded rolling phase (Fs)	IIIe.
Eroded undulating phase (Ft)	IIe.
Eroded hilly phase (Fr)	IVe.
Fullerton silty clay loam:	
Severely eroded rolling phase (Fw)	IIIe.
Severely eroded hilly phase (Fv)	VIe.
Fullerton cherty silt loam:	
Rolling phase (Fh)	IIIe.
Eroded rolling phase (Fe)	IIIe.
Hilly phase (Fg)	IVe.
Eroded hilly phase (Fd)	IVe.
Steep phase (Fk)	VIIe.
Eroded steep phase (Ff)	VIIe.
Fullerton cherty silty clay loam:	
Severely eroded rolling phase (Fm)	IVe.
Severely eroded hilly phase (Fl)	VIe.
Severely eroded steep phase (Fn)	VIIe.
Fullerton loam:	
Eroded rolling phase (Fp)	IIIe.
Eroded hilly phase (Fo)	IVe.
Greendale silt loam (Gb)	IIe.
Greendale cherty silt loam (Ga)	IIs.
Gullied land:	
Shale soil materials (Ge)	VIIe.
Calcareous sandstone soil materials (Gc)	VIIe.
Limestone soil materials (Gd)	VIIe.
Hamblen silt loam (Ha)	IIw.
Hermitage silt loam:	
Undulating phase (Hd)	IIe.
Eroded undulating phase (Hc)	IIe.
Eroded rolling phase (Hb)	IIIe.
Holston loam:	
Eroded undulating phase (Hf)	IIe.
Eroded rolling phase (He)	IIIe.
Huntington silt loam (Hh)	I.
Huntington loam (Hg)	I.
Jefferson loam:	
Eroded undulating phase (Jb)	IIe.
Rolling phase (Jc)	IIIe.
Eroded rolling phase (Ja)	IIIe.
Leadvale silt loam:	
Undulating phase (Lc)	IIe.
Eroded undulating phase (Lb)	IIe.
Eroded rolling phase (La)	IIIe.
Lehew-Montevallo loams:	
Hilly phases (Lg)	VIs.
Eroded hilly phases (Ld)	VIs.
Rolling phases (Lh)	IVs.
Eroded rolling phases (Le)	IVs.
Steep phases (Lk)	VIIs.
Eroded steep phases (Lf)	VIIs.
Lindside silt loam (Ll)	IIw.
Litz shaly silt loam:	
Rolling phase (Lr)	IVs.
Eroded rolling phase (Ln)	IVs.
Eroded undulating phase (Lo)	IIIs.
Hilly phase (Lp)	VIs.
Eroded hilly phase (Lm)	VIs.
Melvin silt loam (Ma)	IIIw.
Minvale silt loam:	
Undulating phase (Mg)	IIe.
Eroded undulating phase (Me)	IIe.
Rolling phase (Mf)	IIIe.
Eroded rolling phase (Md)	IIIe.
Minvale cherty silt loam:	
Rolling phase (Mc)	IIIe.
Eroded rolling phase (Mb)	IIIe.
Monongahela silt loam, undulating phase (Mh)	IIe.
Montevallo shaly silt loam:	
Rolling phase (Ms)	IVs.
Eroded rolling phase (Mo)	IVs.
Eroded undulating phase (Mp)	IIIs.
Hilly phase (Mr)	VIs.
Eroded hilly phase (Mn)	VIs.
Montevallo and Muskingum soils:	
Rolling phases (Ml)	IVs.
Hilly phases (Mk)	VIs.
Steep phases (Mm)	VIIs.
Mullins silt loam (Mt)	IVw.
Muse silt loam:	
Undulating phase (My)	IIe.
Eroded undulating phase (Mw)	IIe.
Rolling phase (Mx)	IIIe.
Eroded rolling phase (Mv)	IIIe.
Eroded hilly phase (Mu)	IVe.
Neubert loam (Na)	IIe.
Pace silt loam:	
Undulating phase (Pe)	IIe.
Eroded undulating phase (Pd)	IIe.
Eroded rolling phase (Pc)	IIIe.
Pace cherty silt loam:	
Rolling phase (Pb)	IIIe.
Eroded rolling phase (Pa)	IIIe.
Prader silt loam (Pf)	IIIw.
Purdy silt loam (Pg)	IVw.
Rockland, limestone (Ra)	VIIs.
Sequatchie loam, undulating phase (Sa)	IIe.
Sequoia silt loam:	
Undulating phase (Sc)	IIe.
Rolling phase (Sb)	IIIe.
Sequoia silty clay loam:	
Eroded undulating phase (Sf)	IIe.
Eroded rolling phase (Se)	IIIe.
Sequoia silty clay, severely eroded rolling phase (Sd)	IVe.
Staser silt loam (Sh)	I.
Staser loam (Sg)	I.
Stony rolling and hilly land, limestone (Sk)	VIIs.
Talbott silty clay loam:	
Eroded undulating phase (Tb)	IIe.
Eroded rolling phase (Ta)	IIIe.
Talbott silty clay, severely eroded rolling phase (Tc)	IVe.
Tellico fine sandy loam:	
Eroded rolling phase (Tg)	IIIe.
Eroded hilly phase (Tf)	IVe.
Steep phase (Tk)	VIIe.
Eroded steep phase (Th)	VIIe.

Tellico clay loam:	
Severely eroded hilly phase (Td)	IVe.
Severely eroded steep phase (Te)	VIIs.
Tellico silt loam, eroded rolling phase (Tl)	IIIe.
Tellico silty clay loam, severely eroded hilly phase (Tm)	VIe.
Tyler silt loam (Tn)	IIIe.
Waynesboro loam, eroded rolling phase (Wc)	IIIe.
Waynesboro cobbly loam:	
Eroded rolling phase (Wb)	IIIe.
Eroded hilly phase (Wa)	IVe.
Whitwell loam (Wd)	IIw.
Wolftever silt loam, undulating phase (We)	IIe.

How to Use and Manage the Soils

Farmers who produce high yields without depleting their soils do these things basic to sound agriculture:

1. Select a suitable crop rotation.
2. Choose suitable crop varieties.
3. Maintain a high level of soil fertility.
4. Correct acidity of the soils.
5. Keep the proper supply of organic matter in the soils.
6. Maintain the good tilth and permeability of the soils.
7. Practice good seedbed preparation, cultivation, and timing of fieldwork.
8. Control weeds, pests, and diseases.

These basic principles apply to all soils, but they are not the total of sound use and management. Before a system of farm management can be considered sound, differences among the soils on the farm must be taken into account. Management for a well-drained, fertile, strongly sloping soil should not be the same as for a poorly drained nearly level soil of low fertility. The basic principles of management apply to both, but in addition, there must be practices to offset, or minimize, the shortcomings of the particular soil. If the main disadvantage of the soil is strong slope, that must be taken into account in planning its management.

To aid farmers in planning use and management, the soils of Bradley County have been placed in 20 management groups. A management group is made up of soils so similar in their characteristics that they need about the same kind of management. Each group is discussed in terms of the following:

1. Important characteristics the soils have in common.
2. The use and management of the soils now practiced.
3. The use and management of the soils judged to be desirable.

Within the framework just outlined, these points are mentioned for each group, if they are pertinent to that group:

a. Intensity of use to which the soils are suited.
b. Kinds of crops suitable for the soils.
c. Length of crop rotations and kinds of crops in the rotations.
d. Kinds of fertilizer needed, and need for lime or other amendments.
e. Methods of tillage required.
f. Need for supplementary practices to control water on the land.
g. Suitability of the soils for pasture, and the practices needed to get pasture started and to keep it producing satisfactorily.

Management Group 1

The soils of management group 1 are level or nearly level, subject to overflow, and usually receive deposits of sediments when flooded by streams. Their natural fertility is medium to high. They range somewhat in acidity. The content of organic matter is moderate to high. The soils are moderately permeable to a depth of several feet, and the supply of moisture is notably favorable for most crops except alfalfa. Tilth is fairly good to excellent. Most of the soils are well supplied with plant nutrients, and the supply is replenished periodically by additions of fresh sediments. Except for the hazard of overflow, all of them are good to excellent soils for crops and pasture.

The soils of group 1 are the following:

Hamblen silt loam (0 to 2 percent slopes).	Lindside silt loam (0 to 3 percent slopes).
Huntington silt loam (0 to 3 percent slopes).	Staser silt loam (0 to 3 percent slopes).
Huntington loam (0 to 3 percent slopes).	Staser loam (0 to 3 percent slopes).

Present use and management.—Much of the acreage in this group is cleared and used intensively. Corn is the most common crop; hay and pasture occupy less acreage. A systematic rotation ordinarily is not used, but on some farms corn may follow small grains or hay crops. Generally, small grains are subject to lodging and damage by floodwaters. Fertilization normally is moderate.

Use suitability and management requirements.—These soils are well suited to intensive use for crops, but their suitability is limited by the risk of flooding. Some of the soils are further limited by somewhat poor drainage. All are well suited to corn, lespedeza, and red clover. Tobacco grows well on the better drained soils, but not on the somewhat poorly drained soils. Cabbage, beans, potatoes, and other truck crops grow well on the better drained soils.

Although row crops can be grown successfully and almost continuously on the soils, a rotation of crops is desirable. Especially well suited to the somewhat poorly drained soils is a rotation of corn and hay. A rotation of corn, wheat, and red clover is suitable for the well-drained soils. Soybeans can be substituted for corn in these rotations. If corn is grown several years in succession, crimson clover or some other winter legumes should be plowed under in spring to provide green manure. Vegetable crops grow well on the soils of the group.

Although good yields are obtained without amendments, fertilizer is needed to keep them high when the soils are used intensively. The response to fertilizer is good, because the soils have a supply of moisture that will allow plants to use the plant nutrients applied. A good response can be expected from the liberal use of phosphorus. Moderate applications of

potassium may benefit many crops. Nitrogen fertilizer may be needed if row crops are grown continuously without including a legume in the rotation. Phosphorus is required to establish and to maintain a good stand of red clover, and in places lime is also needed. Tobacco, cabbage, and other high-value crops may justify heavy applications of complete fertilizer, but the growing of such crops is risky because the soils are subject to overflow.

Special tillage or cropping practices to maintain good tilth ordinarily are not necessary. Generally tilth is easily maintained and can be performed within a fairly wide range of moisture content. Fieldwork on the Lindside and Hamblen soils is somewhat delayed by wetness. Erosion is no hazard on soils of this group, but in a few places productivity may be lowered by the sandy material deposited during floods. In places diversion ditches may be useful in preventing excessive overwash from the adjacent upland slopes.

The range of suitability and the general productivity of the Lindside and Hamblen soils may be increased in many places by artificial drainage. On any particular area, however, the advisability of drainage and the system of drainage used will depend on many factors. Among those to be considered are cost, feasibility of drainage from an engineering standpoint, kinds of soil and acreage, and whether or not other soils on the farm can be drained more advantageously.

High fertility and favorable supply of moisture make these soils especially suitable for pasture. A good stand of high-quality grasses and legumes is easy to establish and maintain, and the favorable moisture supply prolongs the grazing period during drier parts of the growing season. Generally good pasture management includes application of phosphorus and some lime, suppression of weeds, and control of grazing. It is just as important that the pasture be well grazed as not overgrazed. Weeds and other unpalatable plants get a start in undergrazed pastures and force out the desirable plants. In many places it is advisable to supplement proper grazing by mowing of excess herbage and weeds.

Management Group 2

The one soil of this group, Bruno loamy fine sand (0 to 3 percent slopes), is a very sandy soil of the bottom lands. It has excessive drainage. It is low in plant nutrients and very low in organic matter. Permeability is very rapid. The soil ranges from slightly acid to strongly acid and has a low moisture-supplying capacity. It is subject to overflow, and the water table in most places is at depths of 6 to 12 feet.

Present use and management.—Much of this soil is used for crops and pasture. Corn is the chief crop and bermudagrass is used chiefly for pasture. Some fertilizer is used, but yields of crops vary and generally are not high. Where bermudagrass has been established for several years, it develops a good stand and affords a fairly large amount of grazing.

Use suitability and management requirements.—Because of its smooth surface, very good workability and very rapid permeability, this soil is suited to intensive use. Nevertheless, its low content of plant nutrients and organic matter and low moisture-supplying capacity greatly limit its suitability for crops. To maintain a high productivity, the soil needs to be heavily fertilized. Frequent applications must be made, because the soil is not able to hold plant nutrients. If adequately fertilized, this soil is capable of producing at least fair yields of corn, soybeans, and rye and other early maturing crops. Also it is probably well suited to certain early season truck crops and melons. Generally the common grasses, with the exception of bermudagrass, are not productive.

This soil is easy to cultivate, but it is sufficiently loose to make handling of some types of implements somewhat difficult. Runoff presents no problem, but the conservation of plant nutrients and of soil moisture are of major concern in planning the management system. Because of the limited suitability of this soil for crops, much of it probably can be used well for pasture, but its productivity for pasture is not high. Of the plants for pasture, bermudagrass seems the best suited.

Management Group 3

The soils of management group 3 are well drained to somewhat poorly drained. They have formed from local alluvial and colluvial deposits derived from shale, calcareous sandstone, sandy rocks, limestone, or mixtures of these rocks. The soils occur along drainageways and on foot slopes. They have nearly level to gently sloping relief, are permeable, and are mostly deep to very deep to bedrock. Greendale cherty silt loam and Barbourville stony loam contain chert and stones that somewhat interfere with cultivation. The Emory and Neubert soils are the most productive soils in the group and have the highest content of organic matter. On the whole, the soils have good to excellent tilth and, if properly fertilized, their productivity is not difficult to maintain.

The soils of group 3 are the following:

- Barbourville loam (2 to 7 percent slopes).
- Barbourville stony loam (2 to 7 percent slopes.)
- Cotaco silt loam (0 to 7 percent slopes).
- Cotaco loam (0 to 7 percent slopes).
- Emory silt loam (0 to 5 percent slopes).
- Greendale silt loam (2 to 7 percent slopes).
- Greendale cherty silt loam (2 to 7 percent slopes).
- Neubert loam (0 to 5 percent slopes).

Present use and management.—Much of the acreage is used for crops and pasture. Corn is the chief crop, and bluegrass and whiteclover are the principal pasture plants. Alfalfa, small grains, and tobacco are grown to some extent. Corn is grown almost continuously in some places; in others it is rotated with small grains. Some areas remain in permanent pasture much of the time. Fertilizer is not used heavily.

Use suitability and management requirements.—The smooth surface, favorable tilth, good permeability, and sufficient depth to bedrock make most of these soils well suited to intensive use. Corn and legume-grass mixtures for hay and pasture grow well. The better

drained soils, such as the Barbourville, Emory, Neubert, and Greendale, are suited to tobacco, alfalfa, certain truck crops, and many other crops. For high yields the soils need to be heavily fertilized. Although row crops can be grown exclusively, a short rotation that includes the more desirable legumes would increase production and improve the soil. Tilth is easily maintained, and special practices to control runoff are not generally needed. However, where feasible, all cultivation should be on the contour.

If adequately fertilized, all the soils in this group are productive of pasture. Generally the soils are deficient in lime, potassium, and phosphorus. Soils of this group are especially suited to midsummer grazing, because their supply of moisture is more favorable than that of most of the soils of the uplands.

Management Group 4

This group consists of well-drained soils on uplands, stream terraces, and colluvial slopes. The soils have friable or firm subsoils of moderate or moderately slow permeability. Of the group, the Decatur and Farragut soils have the firmest subsoils. All the soils of this group are deep to bedrock, and in most places the bedrock occurs at a depth of 4 feet or more. The surface relief is smooth. The slopes do not exceed 5 percent. Soils of this group have a friable surface soil and good tilth. Natural fertility on the whole is medium to high. All the soils have a moderate content of organic matter. All are medium to strongly acid and have a moderate to high or high capacity for supplying moisture. Runoff is easy to moderately easy to control.

The soils of group 4 are the following:

- Cumberland silty clay loam, eroded undulating phase (2 to 5 percent slopes).
- Decatur silty clay loam, eroded undulating phase (2 to 5 percent slopes).
- Dewey silty clay loam, eroded undulating phase (2 to 5 percent slopes).
- Etowah silt loam, undulating phase (2 to 5 percent slopes).
- Etowah silt loam, eroded undulating phase (2 to 5 percent slopes).
- Farragut silty clay loam, eroded undulating phase (2 to 5 percent slopes).
- Hermitage silt loam, undulating phase (2 to 5 percent slopes).
- Hermitage silt loam, eroded undulating phase (2 to 5 percent slopes).

Present use and management.—Practically all the acreage is cleared, and a great part is used for corn, cotton, hay, small grains, and other crops. Crops are rotated to some extent, but in places row crops are grown several years in succession. Some areas are used for pasture for periods of 2 to 3 years.

Use suitability and management requirements.—Because of their medium or high fertility, good tilth, favorable supply of moisture, and smooth surface relief, the soils of this group are suited to moderately intensive use. Generally 3- to 4-year rotations consisting of a row crop, a small grain, and 1 or 2 years of hay or pasture do well. The soils are suited to practically all the common crops and are among the best in the county for alfalfa. Because their moisture supply is favorable, the soils respond well to fertilizer, and if a high level of management is practiced, they produce high yields.

Usually it is not difficult to maintain good tilth, but on the more eroded parts of the Cumberland and Hermitage soils, some care must be taken to avoid forming clods by plowing the soil when it is too wet. On the more sloping parts that are used several years in succession for row crops, erosion is somewhat of a hazard. In these places close-growing crops should occupy the soils much of the time. Fieldwork should follow the contour, and waterways should remain in sod. Stripcropping or terracing may be needed on long slopes.

If the fertility is kept high, these soils can support good stands of both permanent pasture and winter pasture. Grass-legume pasture requires chiefly phosphorus and lime. The rapid disappearance of excess moisture from the surface makes these soils suitable for plants that supply pasture in winter. Weeds grow rapidly on these fertile soils. Pasture should be mowed periodically.

Management Group 5

In group 5 are undulating well-drained soils of medium to low fertility and moderate to high moisture-supplying capacity. Generally these soils are permeable, light colored, rather low in organic matter, and medium to very strongly acid. They occur on uplands, stream terraces, and colluvial slopes. All of these soils have very good to excellent workability. Runoff is not difficult to control. The soils respond well to proper fertilization, but are somewhat more difficult to keep at a high level of productivity than the soils of group 4.

The soils of group 5 are the following:

- Fullerton silt loam, eroded undulating phase (2 to 5 percent slopes).
- Holston loam, eroded undulating phase (2 to 5 percent slopes).
- Jefferson loam, eroded undulating phase (2 to 5 percent slopes).
- Minvale silt loam, undulating phase (2 to 5 percent slopes).
- Minvale silt loam, eroded undulating phase (2 to 5 percent slopes).
- Muse silt loam, undulating phase (2 to 5 percent slopes).
- Muse silt loam, eroded undulating phase (2 to 5 percent slopes).
- Sequatchie loam, undulating phase (2 to 5 percent slopes).

Present use and management.—Much of the acreage has been cleared and is used for crops. A small part is wooded, and a somewhat larger part is used for pasture. Corn and hay are the chief crops; cotton and tobacco are of some importance as cash crops. Some acreage is in hay, pasture, and small grains grown for grain. There is a great deal of variation in management. A few farmers use a high level of management and apply relatively large amounts of fertilizer, follow good tillage practices, and use good rotations. For alfalfa and tobacco good management is generally practiced. Average management, however, is at a moderately low level, as is indicated by low average yields, failure to rotate crops, and inadequate control of runoff.

Use suitability and management requirements.—These soils are suited to moderately intensive use. Cotton, tobacco, corn, small grains, and many legumes and grasses for hay and pasture are grown. Under

average conditions a 3- or 4-year rotation consisting of a row crop, a small grain, and 1 or 2 years of hay and pasture does well. All of the soils need heavy fertilization, especially for growing alfalfa, tobacco, and the other more exacting crops. The soils require lime for alfalfa, red clover, white clover, orchardgrass, fescue, and the other more desirable legumes and grasses. All the soils need additional organic matter at intervals.

Because of the smooth surface, generally friable nature of the plow layer, and good drainage these soils are easy to work and can be cultivated when fairly wet or dry. Although runoff is not difficult to control, fieldwork should be done according to the contour, especially on the more sloping parts. On most of these soils terracing is feasible, but whether it is practicable or not will depend in part on how frequently row crops are grown. Stripcropping may be used instead of terracing. All waterways should remain in sod.

All of these soils can support good pasture, but they need heavy applications of fertilizer, lime, and proper seeding. Well-established pasture generally affords good grazing through all of the growing season except the driest periods late in summer and in fall.

Management Group 6

The soils in this group are moderately well drained. They are undulating and occupy stream terraces and colluvial slopes. They have friable surface soils. The permeability of the subsoils is moderately slow to slow. These soils are medium to low in plant nutrients, medium to very slow in organic matter, and medium to strongly acid. All are deep to bedrock.

The soils of group 6 are the following:

- Capshaw silt loam, undulating phase (2 to 5 percent slopes).
- Leadvale silt loam, undulating phase (2 to 5 percent slopes).
- Leadvale silt loam, eroded undulating phase (2 to 5 percent slopes).
- Monongahela silt loam, undulating phase (2 to 5 percent slopes).
- Pace silt loam, undulating phase (2 to 5 percent slopes).
- Pace silt loam, eroded undulating phase (2 to 5 percent slopes).
- Wolftever silt loam, undulating phase (2 to 5 percent slopes).

Present use and management.—Much of the acreage in this management group has been cleared and is used for crops. Some of it is pastured, and a small acreage is idle. Not much is still forested. Corn and hay are the chief crops. Small grains and cotton are grown to some extent. For most crops fertilization is moderate. A few pastures are of good quality, but most of them have a rather low carrying capacity, because they are inadequately fertilized and seeded. Generally crop yields are moderate. Good crop rotations are not generally used.

Use suitability and management requirements.—Because of their smooth surface and good tilth, these soils are suited to intensive use, but their low fertility and especially their restricted drainage somewhat limit their suitability for crops. Corn, soybeans, small grains, and legumes and grasses, except alfalfa, are well suited. If dry periods prevail, cotton will produce well, but in the wetter years yields are low. If good management, which includes adequate fertilization, is practiced, a 2- to 3-year rotation is suitable. Under average conditions a 3- to 4-year rotation is better.

To maintain a high productivity, these soils need fertilizer, lime, and organic matter. Good tilth is not difficult to maintain, but tillage may be delayed, because these soils dry more slowly than the well-drained soils. Fieldwork should follow the contour, and waterways should remain in sod. Stripcropping or terracing may be needed on the long slopes.

All of these soils can support good pasture, but they need much fertilizer, lime, and proper seeding. Common lespedeza, sericea lespedeza, whiteclover, and fescue are some of the better suited pasture plants. During the driest part of the grazing period, yields are low on most pastures.

Management Group 7

The soils in this group are somewhat poorly drained. They are level and undulating soils of medium to low fertility that occur on uplands and stream terraces. Except for Whitwell loam, permeability is moderate in the upper part of these soils and moderate to slow in the lower part. The Whitwell soil is moderately permeable throughout. All the soils are medium to strongly acid. They are moderate to low in organic matter. Generally the moisture-supplying capacity is low to moderate, but it is high in the Whitwell soil. The soils have good tilth, but prolonged rains cause wetness that delays fieldwork. Runoff is generally easy to control.

The soils of group 7 are the following:

- Conasauga silt loam, undulating phase (2 to 5 percent slopes).
- Conasauga silt loam, eroded undulating phase (2 to 5 percent slopes).
- Conasauga silt loam, level phase (0 to 2 percent slopes).
- Tyler silt loam (0 to 3 percent slopes).
- Whitwell loam (0 to 3 percent slopes).

Present use and management.—Much of this management group has been cleared. Corn, small grains, hay, and pasture occupy a large part of the acreage. Lespedeza is the most common hay crop. Fertilization is not heavy, but lime has been used on a large part of the acreage. Much acreage of the Conasauga soils is idle, and some areas are in cutover timber.

Use suitability and management requirements.—Because of the smooth surface, good workability, and ability to respond to proper fertilization, these soils are suited to intensive use. The Whitwell soil also has a high moisture-supplying capacity, but the Tyler and Conasauga soils are much less favored in this respect. All of these soils are suited to most of the general farm crops, except alfalfa and cotton. A 3-year rotation of corn, small grain, and red clover for hay is well suited. These soils require heavy applications of all plant nutrients, lime, and organic matter. Good tilth is easy to maintain, although slow drainage limits the periods when the soils can be worked.

To grow productive pasture the soils of this group

require amendments, especially phosphorus and lime. If the soils are properly seeded and fertilized, and otherwise receive needed management, bluegrass, fescue and Ladino or white clover produce good permanent pasture. The Conasauga soils, however, are droughty and have a rather short grazing period.

Management Group 8

All the soils in management group 8 occur on undulating uplands. They have very firm or firm subsoils, but the subsoils of the Apison soils are notably more friable than those of the other soils. The soils range from shallow to deep to bedrock, which is shale or limestone. Except for the Colbert soil, all have internal drainage adequate for all the common field crops. The plow layer ranges from firm for the Colbert and Talbott soils to friable for the Sequoia and Apison soils. The fertility of the soils is medium to low, the content of organic matter is mostly low, and the reaction is medium to strongly acid. The moisture-supplying capacity is moderate in all the soils except the Colbert soil, which has a low moisture-supplying capacity.

The soils of group 8 are the following:

- Apison silt loam, undulating phase (2 to 5 percent slopes).
- Apison silt loam, eroded undulating phase (2 to 5 percent slopes).
- Colbert silty clay, eroded undulating phase (2 to 5 percent slopes).
- Sequoia silt loam, undulating phase (2 to 5 percent slopes).
- Sequoia silty clay loam, eroded undulating phase (2 to 5 percent slopes).
- Talbott silty clay loam, eroded undulating phase (2 to 5 percent slopes).

Present use and management.—Practically all of the acreage of these soils has been cultivated. Corn, hay, and small grains are the chief crops. Lespedeza and red clover are the most common legumes grown for hay, but alfalfa is also grown. On a small acreage tobacco is a cash crop. Little of the acreage is idle. Some is in forest. Some pasture is rotated with crops. Little organic matter is added to the soils, but moderate fertilization is practiced regularly on most areas, and lime has been applied to much of the acreage.

Use suitability and management requirements.—These soils are moderately well suited to tilled crops, but the slow permeability of the subsoils and the shallow depth to bedrock somewhat limit their range of suitability and ability to respond to improved management. The soils can be used in a rotation of moderate length (3 to 4 years). A suitable rotation consists of corn, cotton, or some other row crop, followed by a small grain and by 1 or 2 years of hay. Generally, it is well to keep even these smooth soils covered by a close-growing vegetation as long as possible.

Because of their rather low level of fertility, the soils need substantial applications of fertilizer. Nitrogen, phosphorus, and lime are probably among the amendments that are especially needed, and potassium can be expected to give good response on most areas. All these soils benefit much from applications of organic matter, either in the form of manure or of legume and grass crops turned under.

Because of the fine texture of these soils, good tilth is somewhat difficult to maintain. This does not apply to the Apison soils. The more clayey areas puddle and form clods easily if the soils are tilled when too moist. Additions of organic matter can be expected to improve the tilth. Alfalfa, sweetclover, sericea lespedeza, and other deep-rooted legumes improve the permeability.

All the soils of management group 8, except the Colbert soil, are not greatly subject to erosion, but the slow permeability of the subsoil causes runoff to develop rapidly. A good plant cover aids greatly in controlling runoff. If these soils must be cultivated much of the time, it may be well to carry on fieldwork along the contour, especially on the more sloping parts. Terraces may be practical, but they are not well suited to the soils of this group that are shallow to bedrock. Subsoiling, especially in areas shallow to shale, may be a practical means of temporarily increasing the rate of water infiltration and the moisture-supplying capacity. All waterways should remain in sod.

All of these soils are suited to pasture. If amendments, especially phosphorus and lime, are used correctly, the more desirable legumes and grasses provide a pasture of moderately high carrying capacity. The supply of moisture is relatively favorable for pasture, but during the drier parts of the grazing period plant growth is seriously slowed. The Colbert soil is particularly droughty for pasture.

The soils of this group are suited to winter crops sown for grazing, but the period in which the soil is too wet to withstand trampling is longer than that for the less eroded Fullerton and Tellico soils. Because it is shallow to bedrock and very slowly permeable in the subsoil, the Colbert soil is not suited to tobacco. For this same reason it is poorly suited to alfalfa, corn, and other late-maturing crops. Because the Colbert soil dries up early in the grazing period, the carrying capacity is lower than on the other soils of this group.

Management Group 9

In management group 9 are rolling, well-drained, red soils on uplands, stream terraces, and colluvial slopes. They have dominantly firm subsoils that have prevailingly slow permeability. All the soils are deep or very deep to bedrock. Their moisture-supplying capacity is moderate. All the soils are high in fertility and are medium to strongly acid. All have a moderate supply of organic matter. All have lost material through erosion and are moderately or highly susceptible to further erosion. Workability is prevailingly good.

The soils of group 9 are the following:

- Alcoa loam, eroded rolling phase (5 to 12 percent slopes).
- Bolton silt loam, eroded rolling phase (5 to 12 percent slopes).
- Cumberland silty clay loam, eroded rolling phase (5 to 12 percent slopes).
- Decatur silty clay loam, eroded rolling phase (5 to 12 percent slopes).
- Dewey silty clay loam, eroded rolling phase (5 to 12 percent slopes).
- Etowah silt loam, eroded rolling phase (5 to 12 percent slopes).
- Farragut silty clay loam, eroded rolling phase (5 to 12 percent slopes).
- Hermitage silt loam, eroded rolling phase (5 to 12 percent slopes).

Present use and management.—All of these soils have been cleared and cultivated. Much of the acreage is now used for crops grown in a moderately short rotation. Corn, cotton, hay, and small grains are the chief crops. Pasture occupies a large acreage. Tobacco is an important crop, but its total acreage is small. Only a small part is idle. The soils are moderately fertilized, and much of the acreage has been limed.

Use suitability and management requirements.—If these soils are to be kept stable, a moderately long rotation (4 to 6 years) is required. A suitable rotation consists of corn, cotton, or other row crop, followed by a small grain, and then by 3 or 4 years of legume-grass hay. All of these soils need organic matter and will respond to applications of complete fertilizer. All need lime at intervals of about 6 years. A fairly high level of fertility is not difficult to maintain.

Favorable tilth is maintained without great difficulty, but the more eroded areas should not be cultivated when too wet, because they puddle and form clods fairly easily. Subsoiling may temporarily increase the moisture-absorbing capacity of the soils that have heavier subsoils.

Where feasible, fieldwork should follow the contour. Stripcropping may be practical and useful. If the soils are intensively cropped, terraces may be needed on the long slopes, but in many places a system of management that maintains a close-growing plant cover much of the time is adequate. All waterways should remain in sod.

All the soils of this group will produce permanent pasture. Good stands of the more desirable grazing plants need lime and phosphate and probably potash. Nitrogen fertilizer will help in getting a stand established. After a good stand is growing, occasional mowing helps to maintain pasture of a high quality. Crimson clover, oats, and other winter crops for pasture grow well where the fertility is at a high level. During the period the soils are being tilled and seeded and the herbage is making its early growth, the fairly strong slopes make runoff water a hazard.

Management Group 10

This group consists predominantly of well-drained rolling soils on uplands, stream terraces, and colluvial slopes. The soils are prevailingly light colored. Their subsoils have moderate or moderately slow permeability, and they are deep or very deep to bedrock of cherty limestone or shale. These soils are lower in plant nutrients and organic matter than those in group 9. All are medium acid to very strongly acid and have a moderate moisture-supplying capacity.

The soils of group 10 are the following:

- Fullerton silt loam, rolling phase (5 to 12 percent slopes).
- Fullerton silt loam, eroded rolling phase (5 to 12 percent slopes).
- Fullerton loam, eroded rolling phase (5 to 12 percent slopes).
- Holston loam, eroded rolling phase (5 to 12 percent slopes).
- Jefferson loam, rolling phase (5 to 12 percent slopes).
- Jefferson loam, eroded rolling phase (5 to 12 percent slopes).
- Minvale silt loam, rolling phase (5 to 12 percent slopes).
- Minvale silt loam, eroded rolling phase (5 to 12 percent slopes).
- Muse silt loam, rolling phase (5 to 12 percent slopes).
- Muse silt loam, eroded rolling phase (5 to 12 percent slopes).
- Pace silt loam, eroded rolling phase (5 to 12 percent slopes).
- Tellico fine sandy loam, eroded rolling phase (5 to 12 percent slopes).
- Tellico silt loam, eroded rolling phase (5 to 12 percent slopes).
- Waynesboro loam, eroded rolling phase (5 to 12 percent slopes).
- Waynesboro cobbly loam, eroded rolling phase (5 to 12 percent slopes).

Present use and management.—The largest acreage of these soils is in native forest; the rest has been cleared and cultivated. Corn, cotton, small grains, and hay occupy a great part of the acreage. Lespedeza is the chief hay crop. Alfalfa and tobacco occupy small acreages. There is some unimproved pasture and idle land. A few farmers use systematic crop rotations. Some fertilizer is applied for row crops, especially for the cash crops, and some is used for small grains. Lime has been applied to much of the acreage.

Use suitability and management requirements.—All of these soils are suited to tilled crops and to pasture. They are suited to many market vegetables, tobacco, cotton, and many other crops. These soils are less well suited to alfalfa and to the more exacting legumes and grasses than the more fertile soils of group 9. If the soils are not heavily fertilized, the less exacting legumes and grasses, such as lespedeza, fescue, and redtop, probably are better suited. If the fertility is brought to a high level, however, these soils are suited to moderately long rotations consisting of corn or some other row crop, followed by a small grain and 1 or 2 years of legume-grass hay.

Because of the low or medium fertility of the soils, substantial applications of fertilizer are needed to obtain fairly high yields. These soils will respond to heavy applications of complete fertilizer, lime, and organic matter. When they are brought to a moderately high level of fertility, they can be kept fairly productive. It may be impractical, however, to keep them at the high level of production that is practical for soils like those of the Decatur and Dewey series.

Except in the more eroded patches where the more clayey subsoil is exposed, good tilth is easily maintained. The soils of the group can be worked within a moderately wide range of moisture content. Because of good internal drainage, the soil does not remain wet very long. Fieldwork should follow the contour, and waterways should remain in sod. Stripcropping may be practical and useful on many fields. Terracing may be beneficial in places.

These soils are suited to both permanent pasture and the temporary pasture provided by winter crops, but they need substantial amounts of fertilizer, lime, and all plant nutrients. Although permanent pasture of high quality is somewhat more difficult to maintain than on soils of several of the other groups, grazing of moderately high carrying capacity is feasible. The supply of moisture for pasture is moderately favorable, except during the drier parts of the grazing period. During that time the plants cease to grow. These friable silt loam or loam surface soils have good internal drainage. They are suited to winter grazing and less

subject to damage by trampling than finer textured soils.

Management Group 11

The soils of management group 11 consist of predominantly well drained rolling cherty soils of low fertility. These soils occur on uplands and colluvial slopes. They are light colored, prevailingly deep to very deep, and moderately to slowly permeable in the subsoil. Their natural fertility and content of organic matter are low or very low. They are strongly acid or medium to strongly acid. Internal drainage of all the soils is medium. These soils have a moderate moisture-supplying capacity. Workability is good except where the high content of chert fragments interferes with use of tillage implements.

The soils of group 11 are the following:

- Clarksville cherty silt loam, rolling phase (5 to 12 percent slopes).
- Clarksville cherty silt loam, eroded rolling phase (5 to 12 percent slopes).
- Fullerton cherty silt loam, rolling phase (5 to 12 percent slopes).
- Fullerton cherty silt loam, eroded rolling phase (5 to 12 percent slopes).
- Minvale cherty silt loam, rolling phase (5 to 12 percent slopes).
- Minvale cherty silt loam, eroded rolling phase (5 to 12 percent slopes).
- Pace cherty silt loam, rolling phase (5 to 12 percent slopes).
- Pace cherty silt loam, eroded rolling phase (5 to 12 percent slopes).

Present use and management.—A very great part of the acreage of these soils has been cultivated. Most of it is now used for crops, and some is used for pasture. There is a small acreage of idle land. Some fertilization is practiced for row crops and small grains. Lime has been supplied to much of the acreage.

Use suitability and management requirements.—These soils are suited to tilled crops, but the moderately strong slopes limit their suitability to rotations of not more than moderate length. A suitable rotation consists of corn or some other row crop followed by a small grain, and this, in turn, by 2 years of hay or pasture. A somewhat longer rotation may be preferable, especially on the stronger slopes, and where heavy fertilization is not practiced. Red clover, lespedeza, fescue, orchardgrass, and timothy are probably among the most suitable legumes and grasses grown for hay. If especially good management is practiced, alfalfa will produce fairly well on the Fullerton and Minvale soils.

All soils of this group need much fertilizer for all crops and lime for most of the legumes. They respond well to additions of organic matter. Alfalfa especially needs substantial additions of plant nutrients and lime.

Except in the patches where the subsoil is exposed, tilth is good and can be fairly easily maintained. In all areas except those where the plow layer consists mostly of subsoil, these soils can be cultivated within a moderately wide range of moisture content. Chert interferes with cultivation. Fieldwork should follow the contour, and waterways should remain in sod. Stripcropping may be practical and useful on many fields. Terracing may be beneficial in places.

All of the soils of group 11 can produce fairly good permanent pasture, but soils of greater fertility are more productive of the more exacting legumes and grasses. The supply of moisture for pasture plants is only moderately favorable, and pasture vegetation ceases to grow and becomes dry early in droughty periods. Most of the acreage is well suited to winter crops for pasture.

Because these soils are low in fertility, they are less well suited to crimson clover than the more fertile soils. If the fertility is brought to a high level, however, all the crops commonly grown for winter grazing will produce well. Because they have a friable surface soil and generally good internal drainage, these soils withstand trampling better under the moist weather of winter than do the soils of finer texture.

Management Group 12

The soils in group 12 are rolling, slowly permeable, and low or medium in fertility. These soils occur on uplands and colluvial slopes. All except the Leadvale soil have very firm clayey subsoils, and all have notably impaired internal drainage. Most of the acreage is moderately deep to bedrock. A small acreage is shallow, and much of the acreage of the Leadvale soil is deep. The fertility is low for all of the soils except the Talbott. The fertility of the Talbott soil is medium.

The moisture-supplying capacity of the soils is moderate to low, and much of the acreage is rather droughty. Workability in general is fair to poor, except for the Leadvale soil and the uneroded Sequoia soil, for which the workability is somewhat better. Chiefly because of fairly strong slopes and slow permeability of the soil, there is much risk of erosion.

The soils of group 12 are the following:

- Leadvale silt loam, eroded rolling phase (5 to 12 percent slopes).
- Sequoia silt loam, rolling phase (5 to 12 percent slopes).
- Sequoia silty clay loam, eroded rolling phase (5 to 12 percent slopes).
- Talbott silty clay loam, eroded rolling phase (5 to 12 percent slopes).

Present use and management.—Practically all of the acreage in this management group has been cropped. A large part is now used for pasture or is idle. Some of the pasture has been improved by seeding and fertilization, but the rest is relatively unimproved. Corn, cotton, hay, and small grains occupy most of the cropped acreage. A small part is in alfalfa.

Use suitability and management requirements.—Chiefly because of the moderately strong slopes, slow permeability of the subsoil, and moderate to high erodibility, these soils have only a medium range of suitability for crops. They are not suited to truck crops, especially not to root crops. Row crops of all kinds should be grown infrequently. Normally, to keep the soil under close-growing crops much of the time, a 5- to 6-year rotation is needed. A rotation of corn, small grain, and then 3 to 5 years of legumes and grasses is suitable. If the fertility is brought to a high level, alfalfa, red clover, orchardgrass, timothy, bluegrass, white clover, and others of the more desirable legumes are suited. Winter crops for pasture are fairly well

suited, but until these crops can establish an effective cover, erosion is a special hazard. During periods of excess moisture, grazing needs to be restricted in many places because of the clayiness of the surface soil. To maintain satisfactory productivity on these soils of fairly low fertility, substantial amounts of organic matter, fertilizer, and lime are needed.

Because of the clayey plow layer, especially in the more eroded parts, much care is needed to keep good tilth. Tillage can be carried on without detriment to tilth only within a narrow range of moisture content. Tilth may be improved by fall plowing that exposes the clods to freezing and thawing. The risk of erosion, however, is increased by such plowing.

Runoff on these soils is generally high, because moisture percolates slowly through them and slopes are strong. Fieldwork should follow the contour. A good plant cover should be maintained as long as possible. Stripcropping may be feasible on the longer slopes. The construction of terraces is not generally practicable because of the clayey nature of the subsoil and the generally shallow depth to bedrock.

These soils are suited to permanent pasture. If the fertility is brought to a high level, they can support a good stand of the more desirable legumes and grasses. Except for the Leadvale soil, the low moisture-supplying capacity greatly limits the grazing period.

Management Group 13

The soils in management group 13 consist of Apison silt loam, rolling phase, and Apison silt loam, eroded rolling phase. These are well-drained shallow to moderately deep soils of uplands that are underlain by shale. They are low in fertility and organic matter and are medium to strongly acid. Their subsoils are more friable and more permeable than those of management group 12.

Present use and management.—About two-thirds of the total acreage of these soils has been cultivated; the rest is in cutover mixed deciduous and pine forest. Much of the cleared acreage is now used for crops and pasture, but a considerable part is idle. Generally, the productivity level is moderate to low.

Use suitability and management requirements.—Because of strong slopes, low fertility, and somewhat limited depth to bedrock, the management requirements for these soils are exacting. The soils are suited to most of the general farm crops. Long rotations should be used, however, to keep the soils covered most of the time. Small grains and hay should predominate.

Because the soils are low in fertility, they need heavy applications of plant nutrients and organic matter to keep productivity at a reasonably high level. The productivity level that can be attained by these soils and the soils of management group 12 is greatly limited by their low moisture-supplying capacity.

Because of the friable nature of the surface soil and the subsoil, tilth on these soils is somewhat better than on the soils of management group 12. Workability is not too favorable, because of the rather strong slopes and shallowness of the more friable plow layer.

Erosion is less of a hazard than for the soils of management group 12, because of the more friable permeable nature of the subsoil. Waterways should be kept in grass permanently, and cultivation should be along the contour. In places, stripcropping may be practical and worthwhile, but the shallow soils do not generally lend themselves to terracing.

Because it is difficult to keep these soils productive, it may be more practical to use much of the acreage for pasture. Nevertheless, their low fertility, strongly acid reaction, and small moisture-supplying capacity greatly restrict their carrying capacity. Unless fertilizer and lime are applied heavily, the less exacting legumes and grasses produce better than those that provide better forage but need more careful management.

Management Group 14

The soils in management group 14 are somewhat excessively drained, severely eroded, and rolling. They are on uplands and stream terraces. Their plow layers, a silty clay loam or silty clay, have poor tilth and a low moisture-supplying capacity. They become hard upon drying. These soils are medium to low in plant nutrients, very low to low in organic matter, and medium to strongly acid. All except the Farragut and Talbott soils are deep to very deep to bedrock; these two range from shallow to deep. Permeability of the subsoils ranges from moderately slow to very slow.

The soils of group 14 are the following:

Colbert silty clay, eroded rolling phase (5 to 12 percent slopes).
Cumberland silty clay loam, severely eroded rolling phase (5 to 12 percent slopes).
Dewey silty clay, severely eroded rolling phase (5 to 12 percent slopes).
Farragut silty clay, severely eroded rolling phase (5 to 12 percent slopes).
Fullerton silty clay loam, severely eroded rolling phase (5 to 12 percent slopes).
Fullerton cherty silty clay loam, severely eroded rolling phase (5 to 12 percent slopes).
Talbott silty clay, severely eroded rolling phase (5 to 12 percent slopes).

Present use and management.—These soils have been cleared and cropped. Part of the acreage is now cropped, but much of it is in unimproved pasture or idle. Generally management is not at a high level, and yields are much lower than on less eroded soils of the same series.

Use suitability and management requirements.—Because of unfavorable tilth, slow permeability, moderately strong slopes, low fertility, and low content of organic matter, these soils are limited in their suitability for tilled crops. If practicable, they should be kept under a close-growing permanent vegetation much of the time. Only very long rotations should be used. A rotation consisting of a small grain followed by several years of legume-grass hay and pasture is well suited.

These soils need much fertilizer, lime, and organic matter to keep their productivity fairly high. Their limited moisture-supplying capacity makes it difficult

to estabilsh a good close-growing cover of legumes and grasses.

Good tilth is difficult to obtain. Addition of organic matter and the use of deep-rooted legumes and grasses should aid greatly in improving tilth; fall plowing also aids. These soils should have a protective cover in winter. Generally the soils are highly erodible. A vigorous legume-grass cover is one of the most practical means of controlling erosion. All fieldwork should be done on the contour. Under some circumstances stripcropping may be practical. If these soils are intensively cultivated, terraces may be needed on the long slopes.

If these soils are adequately fertilized, they can support a pasture of high quality. During the drier parts of the grazing period the carrying capacity of pasture, however, is limited by the small moisture-supplying capacity of these soils. Winter pasture crops are much less productive than on many of the more friable fertile soils. If subsoil moisture content is excessive, as it commonly is in winter, the clayey soils puddle easily when trampled by livestock.

Management Group 15

In management group 15 are well-drained to somewhat excessively drained soils of low to medium fertility. They occur on uplands, stream terraces, or colluvial slopes. All except the Tellico and Waynesboro are deep to very deep to bedrock. The Tellico and Waynesboro range from shallow to very deep. The Clarksville soils and some of the Fullerton soils have chert that materially interferes with cultivation. All the soils absorb moisture well, and generally they have a moderate moisture-supplying capacity. They have a moderate to low content of organic matter and plant nutrients and are medium to very strongly acid.

The soils of group 15 are the following:

- Bolton silt loam, eroded hilly phase (12 to 25 percent slopes).
- Clarksville cherty silt loam, hilly phase (12 to 25 percent slopes).
- Clarksville cherty silt loam, eroded hilly phase (12 to 25 percent slopes).
- Fullerton silt loam, eroded hilly phase (12 to 25 percent slopes).
- Fullerton cherty silt loam, hilly phase (12 to 25 percent slopes).
- Fullerton cherty silt loam, eroded hilly phase (12 to 25 percent slopes).
- Fullerton loam, eroded hilly phase (12 to 25 percent slopes).
- Muse silt loam, eroded hilly phase (12 to 25 percent slopes).
- Tellico fine sandy loam, eroded hilly phase (12 to 25 percent slopes).
- Waynesboro cobbly loam, eroded hilly phase (12 to 25 percent slopes).

Present use and management.—Some of the acreage is in cutover deciduous forest, some is cropped, and the rest is used chiefly for unimproved pasture. There is a notable acreage of idle land. Corn, cotton, and hay are the chief crops. Lespedeza is the main hay crop. Except for row crops, not much fertilization is practiced. Lime has been applied to some of the land.

Use suitability and management requirements.—Because of strong slopes and moderately slow permeability, these soils are highly erodible and difficult to work. If their fertility is kept high and much care is taken in cultivation, long crop rotations can be used. Although row crops can be grown occasionally, the rotation should consist mainly of small grains, grasses, and legumes. Heavy applications of organic matter and all the plant nutrients, as well as liming, are required to keep productivity high. Then good stands of the more exacting legumes and grasses can be grown on all the soils, except possibly the Clarksville.

Tilth is good, except on the cherty soils. The chert fragments may interfere with cultivation. In some severely eroded patches tilth is poor, because the plow layer consists largely of clayey subsoil. Soils of this group usually can be worked within a moderately wide range of moisture content. There is a notable erosion hazard on the strong slopes, and careful planning is needed to control erosion if such slopes are tilled. Stripcropping may be useful to restrain surface runoff, but because of the strong slopes, terracing is not practical. Tillage should follow the contour, and waterways should be kept under grass.

Much of the acreage can be used for permanent pasture, but substantial amounts of fertilizer must be applied to get a good stand. All of these soils need lime. For pasture plants the supply of moisture is moderately favorable, but during the drier parts of the grazing period the herbage commonly ceases to grow. Generally, in dry periods the north-facing slopes can be grazed longer than the south-facing slopes.

Management Group 16

In management group 16 are excessively drained, rolling and undulating, very shallow to shallow soils of very low or low fertility. These soils occur on uplands underlain by shale. The content of organic matter is low or very low. In most places the Dandridge soil is not acid and has calcareous shale at depths of 1 to 3 feet. The other soils are medium to strongly acid. Productivity ranges from low to very low. All except the Sequoia soil are at least moderately permeable. The moisture-supplying capacity of the soils is low or very low. Tillage is difficult, because the soils are shallow to bedrock.

The soils of group 16 are the following:

- Apison silt loam, severely eroded rolling phase (5 to 12 percent slopes).
- Dandridge shaly silt loam, eroded rolling phase (5 to 12 percent slopes).
- Lehew - Montevallo loams, rolling phases (5 to 12 percent slopes).
- Lehew - Montevallo loams, eroded rolling phases (5 to 12 percent slopes).
- Litz shaly silt loam, rolling phase (5 to 12 percent slopes).
- Litz shaly silt loam, eroded rolling phase (5 to 12 percent slopes).
- Litz shaly silt loam, eroded undulating phase (2 to 5 percent slopes).
- Montevallo shaly silt loam, rolling phase (5 to 12 percent slopes).
- Montevallo shaly silt loam, eroded rolling phase (5 to 12 percent slopes).
- Montevallo shaly silt loam, eroded undulating phase (2 to 5 percent slopes).
- Montevallo and Muskingum soils, rolling phases (5 to 12 percent slopes).
- Sequoia silty clay, severely eroded rolling phase (5 to 12 percent slopes).

Present use and management.—Most of the acreage has been cleared and cropped. One-half to two-thirds of the cleared acreage is now idle or in unimproved pasture. Corn, cotton, and hay—chiefly lespe-

deza—are the principal crops. Small grains, chiefly oats, are grown on a small part. Where good management has been practiced, alfalfa is also grown, but this acreage is small.

Use suitability and management requirements.—Because of strong slopes, shallow depth to bedrock, and low fertility, these soils are poor for cultivation. The two undulating phases are fair for tilled crops, but shallowness to bedrock limits their usefulness.

The soils of this group are suited to permanent pasture, and if the fertility has been brought to a high level, good stands of legumes and grasses can be maintained. Except for the Dandridge soil, all the soils need lime. The low moisture-supplying capacity of the soils greatly limits the growth of herbage and restricts the length of time during which pasture can be grazed.

The management for areas that must be used for crops is very exacting. Because the moisture-supplying capacity is limited, yields are lower than on more desirable soils. Because of the erosion hazard, the low level of fertility, and the rather unfavorable tilth, the rotations should consist mainly of close-growing crops, preferably the perennial legumes and grasses. Fieldwork should follow the contour. On some fields, stripcropping may be practicable.

Management Group 17

The soils in management group 17 are predominantly hilly. Because of their moisture-supplying capacity and other qualities, they will produce pasture if properly fertilized. All of these soils are on uplands and are somewhat excessively to excessively drained. The stony land type and the Tellico soils are shallow to bedrock. The others are moderately deep to bedrock. It is not practical to till the stony land type.

The soils of group 17 are the following:

Bolton silt loam, eroded steep phase (25 to 60 percent slopes).
Cumberland silty clay loam, severely eroded hilly phase (12 to 25 percent slopes).
Fullerton silty clay loam, severely eroded hilly phase (12 to 25 percent slopes).
Stony rolling and hilly land, limestone (5 to 25 percent slopes).
Tellico clay loam, severely eroded hilly phase (12 to 25 percent slopes).
Tellico silty clay loam, severely eroded hilly phase (12 to 25 percent slopes).

Present use and management.—All the acreage that is not stony has been cleared and cultivated at some time. Much of it is now used for pasture, but some is idle. A small part is used for corn, cotton, small grains, hay, and similar crops. Not much fertilizer is applied. Lime has been used on some areas. Most of the pasture is unimproved.

Much of the Stony rolling and hilly land, limestone, is cleared, but very little has been cultivated. Practically all of this land type is used for pasture. Little or no fertilizer or lime has been used.

Use suitability and management requirements.—Because of the strong slopes and the clayiness of the plow layer, these soils are poor for crops. Stony rolling and hilly land, limestone, however, is not cultivated because of its stoniness.

Under average conditions the severely eroded phases do not produce much pasture. Nevertheless, with adequate fertilization, liming, and proper seeding, all of the soils of this group can provide fair stands of high-quality forage. Stony rolling and hilly land, limestone, may not need seeding; however, it can be expected to respond to liming and to fertilization, especially with phosphorus.

The low moisture-supplying capacity of the soils limits the carrying capacity of pasture. The plants stop growing rather quickly during dry periods. During the dry spells the pasture plants seem to continue growing on the north-facing slopes after they have stopped growing on the south-facing slopes. Runoff should not be allowed to accumulate in channels. Gullies that have developed may need special attention. Little or none of Stony rolling and hilly land, limestone, is suitable for crops.

Severely eroded areas that must be used for crops need careful management. The soils are difficult to work. Good tilth and the conservation of soil material are major problems. If it can be avoided, row crops should not be grown. Rotations should consist of fall-sown small grains and legume-grass mixtures for hay and pasture.

Some areas of these soils, particularly the areas of the Tellico soils, are best used for timber production because, under any other use, if may not be possible to control erosion.

Management Group 18

The soils in management group 18 are hilly and steep and shallow or very shallow. They are on uplands underlain by shale. The soils are low to very low in fertility and organic matter. They have a low moisture-supplying capacity. The Dandridge soils are underlain predominantly by calcareous shale and generally are the soils on which it is easiest to maintain legume-grass pasture. The Litz, Montevallo, and Lehew soils are medium to strongly acid. The Litz soils are somewhat more productive of pasture than the Lehew and Montevallo.

The soils of group 18 are the following:

Dandridge shaly silt loam, hilly phase (12 to 25 percent slopes).
Dandridge shaly silt loam, eroded hilly phase (12 to 25 percent slopes).
Dandridge shaly silt loam, steep phase (25 to 60 percent slopes).
Dandridge shaly silt loam, eroded steep phase (25 to 60 percent slopes).
Lehew - Montevallo loams, hilly phases (12 to 25 percent slopes).
Lehew - Montevallo loams, eroded hilly phases (12 to 25 percent slopes).
Litz shaly silt loam, hilly phase (12 to 25 percent slopes).
Litz shaly silt loam, eroded hilly phase (12 to 25 percent slopes).
Montevallo shaly silt loam, hilly phase (12 to 25 percent slopes).
Montevallo shaly silt loam, eroded hilly phase (12 to 25 percent slopes).

Present use and management.—Part of these soils is in native deciduous forest that is now cut over. On the cleared areas some acreage is used for hay, cotton, and corn, but a great part is used for unimproved

pasture or is idle. On the more productive areas, bluegrass and whiteclover make up an apppreciable part of the cover. Broomsedge, briers, bushy growth, and other less desirable vegetation prevail in the less favorable places. On these droughty soils more cotton than corn is grown, because cotton is more drought resistant.

Use suitability and management requirements.—Because of the shallowness to bedrock and strong slopes, these soils are poor for crops. Most of the acreage can support desirable grazing, but the length of the grazing period and the carrying capacity of the pasture are limited by the small moisture-supplying capacity. In most places the Dandridge soils produce some bluegrass and whiteclover. They do not need lime for their improvement, but good response can be expected from proper fertilization. The other soils, especially the Lehew and Montevallo, need heavy fertilization, as well as lime, to establish and maintain good pasture. Overgrazing should be avoided because strong slopes and shallow depth damage stands and accelerate erosion. Reseeding of pastures should be by contour strips.

Areas that are needed for crops, especially for those crops that require a long growing season, cannot be expected to give high yields, because they are subject to erosion and difficult to work. Small grains sown in fall are probably among the better suited crops, because they mature before the season gets too dry. On the Dandridge and Litz soils, fair stands of alfalfa can be established, but yields will be greatly limited by lack of moisture during dry periods.

Management Group 19

In management group 19 are predominantly poorly drained soils of the bottom lands, stream terraces, and uplands. Except for the Dowellton soil, they are nearly level and generally occupy slight depressions. The Dowellton soil is undulating and is somewhat poorly drained rather than poorly drained. Fertility ranges from medium to low, and the reaction ranges from slightly to strongly acid. The moisture-supplying capacity varies greatly. For the Prader, Melvin, and Mullins soils it is moderate to high, and for the Dowellton and Purdy soils it is low. All of these soils stay wet throughout winter and spring, but late in summer and in fall they are generally droughty, especially the Dowellton, Mullins, and Purdy soils.

The soils of group 19 are the following:

Dowellton silty clay loam (2 to 5 percent slopes).
Melvin silt loam (0 to 3 percent slopes).
Mullins silt loam (0 to 2 percent slopes).
Prader silt loam (0 to 3 percent slopes).
Purdy silt loam (0 to 3 percent slopes).

Present use and management—Much of the acreage has been cleared, but only small parts have been cultivated. At present much of the soil is in pasture; a small part is used for corn and hay. A few areas have been improved by artificial drainage. A large part of Mullins silt loam is wooded.

Use suitability and management requirements.—With natural drainage, these soils are poor for crops and are only fairly productive of pasture. Better drainage will improve these soils for crops and pasture. Substantial fertilization, liming, and proper seeding will somewhat improve pasture. The better drained areas may produce some soybeans and other late-season crops. During dry periods the Dowellton, Mullins, and Purdy soils dry quickly, and their grazing capacity is lower than that of the Melvin and Prader soils. If the content of organic matter is increased, the moisture-supplying capacity of these soils may also increase.

With adequate fertilization, liming, and additions of organic matter, the areas that have been artificially drained can produce pasture and certain crops. Because of their shallow depth to bedrock, the Mullins and Dowellton soils are especially difficult to drain. Because of their slow permeability, the Purdy and Melvin soils are not particularly easy to drain. Corn and soybeans are among the row crops better suited to artificially drained areas. Lespedeza, alsike clover, red clover, white clover, fescue, and timothy are among the legumes and grasses better for use as hay and pasture.

The practicability of draining these soils depends on several factors, among which are (1) the possibility of obtaining an adequate outlet for drainage water; (2) the permeability of the soil; (3) the cost of installing the drainage system weighed against the value of the increased production; and (4) the need for additional cultivated acreage on the farm.

Management Group 20

The soils of management group 20 are shallow to bedrock, stony, gullied, low in fertility, or steeply sloping. They are not suited to crops or pasture, and on most farms they are probably best used for forest. All of them are very low to low in fertility, but in other characteristics they may vary greatly.

The soils of group 20 are the following:

Clarksville cherty silt loam, steep phase (25 to 60 percent slopes).
Fullerton cherty silt loam, steep phase (25 to 60 percent slopes).
Fullerton cherty silt loam, eroded steep phase (25 to 60 percent slopes).
Fullerton cherty silty clay loam, severelv eroded hilly phase (12 to 25 percent slopes).
Fullerton cherty silty clay loam, severely eroded steep phase (25 to 60 percent slopes).
Gullied land, shale soil materials (5 to 60 percent slopes).
Gullied land, calcareous sandstone soil materials (5 to 75 percent slopes).
Gullied land, limestone soil materials (5 to 60 percent slopes).
Lehew - Montevallo loams, steep phases (25 to 60 percent slopes).
Lehew - Montevallo loams, eroded steep phases (25 to 60 percent slopes).
Mines, pits, and dumps (1 to 60 percent slopes).
Montevallo and Muskingum soils, hilly phases (12 to 25 percent slopes).
Montevallo and Muskingum soils, steep phases (25 to 60 percent slopes).
Rockland, limestone (3 to 60 percent slopes).
Tellico fine sandy loam, steep phase (25 to 60 percent slopes).
Tellico fine sandy loam, eroded steep phase (25 to 60 percent slopes).
Tellico clay loam, severely eroded steep phase (25 to 60 percent slopes).

Present use and management.—A large proportion of the acreage is in cutover forest. Almost all of the acreage not in forest has been cleared and cropped at some time. Some areas have been abandoned and have reseeded to forest; other areas have been planted to trees. Virginia, loblolly, and shortleaf pines predominate on the revegetated areas, but some areas have naturally reseeded to locust.

Generally, little is done to safeguard the forests from overgrazing, fires, and overcutting. Additional cropped land that is abandoned continues to be revegetated by trees; small acreages are being planted, chiefly to pines. Part of the acreage that is not revegetated is used chiefly for corn, cotton, hay, and other crops, and for pasture. The management of this part is at a low level.

Use suitability and management requirements.—Unfavorable soil characteristics limit the suitability of these soils to forest. On farms where there is a great need for pasture or crops, however, it may be better to use the more desirable tracts for that purpose. Areas used for crops need exacting management. Only in exceptional places can high yields be expected. Among the difficult problems involved in using these soils for crops are maintenance of fertility and adequate moisture, control of runoff, and carrying on of fieldwork.

Radical changes in forest management are needed to halt the progressive deterioration of the forest resources of the county. A greater value must be placed on the potential crop of sawtimber. The chief management requirements for areas now under forest are (1) fire control, (2) grazing control, and (3) proper harvesting methods. Fire control is important to protect the trees as well as the forest litter that is needed to maintain soil porosity and to restrain runoff. Grazing is unfavorable to forest, chiefly because the young replacement growth is killed by browsing. Also trampling from much grazing compacts the soil and destroys the humus. This produces a less porous soil and results in slower and less absorption of moisture.

Estimated Yields

The soils of Bradley County are listed in table 7 to show the average acre yields of the principal crops that may be expected over a period of years under each of two levels of management. Pasture yields are estimated in number of days an acre will provide grazing for a grown cow without injury to the pasture.

The estimates for crops are based primarily on information received through interviews with farmers, the county agricultural agent, and others who have had experience in the agriculture of the county. The estimates are as accurate as can be made without detailed, lengthy investigations. They represent the relative productivity of the soils shown on the map and furnish the best available summation of factors associated with the productivity of the land. The yields are estimated on a county-wide basis and therefore do not apply directly to any particular farm or area of land.

In columns A of table 7 are estimated average acre yields under common management. Under this management, a relatively poorly defined system of crop rotation is used, moderate amounts of fertilizer are applied for tobacco, and little fertilizer is applied for corn, small grains, legumes, and pasture.

In columns B of table 7 are estimated average acre yields under improved management. At this level of management, larger applications of lime and fertilizer are used and are applied more frequently; crops are carefully selected to suit the soils and are rotated; legume cover crops are used to maintain or increase supplies of organic matter and nitrogen in the soil; and as needed, careful tillage, contour farming, terracing, stripcropping, and sod waterways are used to control erosion and maintain productivity. For pasture, the chief practices are application of fertilizer and lime, control of grazing, and clipping of undesirable herbage.

The management practices for common and improved management are more fully defined in the section, How to Use and Manage the Soils. In that section the soils are placed in management groups and suitable methods of management are described for each group. The practices for common management are given for each group under the subheading, *Present use and management*, and those for improved management under the heading, *Use suitability and management requirements.*

By comparing yields in columns A and B in table 7, the response of a soil to improved management can be judged. The yields under improved management (columns B) do not define the maximum possible production on the various soils. They are believed to be yields that most farmers will find it practical to reach, if they choose to apply the practices suggested.

The level of management a farm operator chooses depends on many things in addition to the soils on the farm. Before making his choice, he will consider probable prices, distance to market, the type of farm enterprise he wishes to follow, and many other factors. His choice of crops will affect management. Different crops, planted on the same soil, will require different management. Likewise, the same crop, planted on different soils, will require different management.

Soil Associations

The map of soil associations at the back of this report shows general patterns of soils in the county. Each association contains two or more different soil series, which form a recurring geographic pattern. Usually the pattern is related to shape of the land surface, nature of the soil materials, and kind of vegetation or some other feature.

Soil associations are useful in land use planning, because it is important to know how soils are distributed. For example, a soil suitable for corn may or may not be used for corn, depending on whether it occurs with soils suitable for corn or soils not suitable for corn. By studying the geographic pattern of soils, along with the characteristics of the soils, suitable agricultural uses can be predicted for large areas.

The twelve soil associations recognized in Bradley

TABLE 7.—*Average acre yields of crops to be expected over a period of years on the soils of Bradley County, Tenn. under two levels of management*

[Yields in columns A to be expected under common management, and yields in columns B, under improved management. See text for practices used at the two levels of management. Dotted lines indicate crop ordinarily is not grown under the level of management specified. To allow comparison of yields in this table with those considered standard for the United States, the following standard yields are listed (*11*): Corn = 50 bushels. Wheat = 25 bushels. Alfalfa = 4 tons. Burley tobacco = 1,500 pounds. Permanent pasture = 100 cow-acre-days]

Soil	Corn		Wheat		Alfalfa		Burley tobacco		Permanent pasture		Management group
	A	B	A	B	A	B	A	B	A	B	
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days* [1]	*Cow-acre-days* [1]	
Alcoa loam, eroded rolling phase	30	52	13	22	2.3	3.0	1,200	1,600	70	115	9
Apison silt loam:											
Undulating phase	22	42	13	22	1.6	2.2	900	1,300	65	100	8
Eroded undulating phase	21	41	12	21	1.4	2.0	800	1,200	60	95	8
Rolling phase	20	36	11	20	1.9	2.4			55	90	13
Eroded rolling phase	18	34	9	18	1.7	2.2			50	85	13
Severely eroded rolling phase			5	12					20	40	16
Barbourville loam	35	55	13	20	2.0	2.4	1,200	1,700	75	120	3
Barbourville stony loam	27	49	10	17	2.1	2.7	1,100	1,600	70	115	3
Bolton silt loam:											
Eroded hilly phase	23	43	13	22	2.2	2.9	1,100	1,400	65	110	15
Eroded rolling phase	29	50	13	22	2.4	3.1	1,200	1,600	70	115	9
Eroded steep phase									50	85	17
Bruno loamy fine sand	15	30	5	10					15	45	2
Capshaw silt loam, undulating phase	30	50	13	22	1.6	2.2	1,200	1,600	70	115	6
Clarksville cherty silt loam:											
Rolling phase	17	38	8	17			900	1,300	30	65	11
Eroded rolling phase	15	35	6	15			900	1,300	30	65	11
Hilly phase	15	35	7	16			850	1,200	27	60	15
Eroded hilly phase	14	33	7	15			800	1,200	25	60	15
Steep phase									25	60	20
Colbert silty clay:											
Eroded undulating phase	15	28	10	14	.8	1.4			55	85	8
Eroded rolling phase	12	20	8	12					45	75	14
Conasauga silt loam:											
Undulating phase	20	40	11	18					60	90	7
Eroded undulating phase	17	37	10	17					55	85	7
Level phase	25	38	5	14					65	95	7
Cotaco silt loam	30	50	13	20					85	150	3
Cotaco loam	25	48	10	18					75	120	3
Cumberland silty clay loam:											
Eroded undulating phase	38	60	16	26	2.8	3.5	1,500	1,900	90	130	4
Eroded rolling phase	30	52	15	25	2.6	3.3	1,300	1,700	75	125	9
Severely eroded rolling phase	17	34	8	18	1.6	2.5			55	100	14
Severely eroded hilly phase			6	14	1.1	1.9			30	70	17
Dandridge shaly silt loam:											
Hilly phase	18	28	8	17	1.7	2.2			50	85	18
Eroded hilly phase	17	27	8	17	1.6	2.1			45	85	18
Eroded rolling phase	18	30	10	19	1.7	2.2			55	95	16
Steep phase									40	75	18
Eroded steep phase									35	70	18
Decatur silty clay loam:											
Eroded undulating phase	38	60	16	26	2.8	3.5	1,500	1,900	90	130	4
Eroded rolling phase	32	55	15	25	2.7	3.4	1,400	1,800	80	125	9
Dewey silty clay loam:											
Eroded undulating phase	36	58	15	25	2.7	3.4	1,500	1,900	85	130	4
Eroded rolling phase	30	52	15	24	2.6	3.3	1,300	1,700	75	125	9
Dewey silty clay, severely eroded rolling phase	15	35	7	16	1.3	2.1			40	85	14
Dowellton silty clay loam	9	20							25	45	19
Emory silt loam	47	70	18	26	2.4	3.1	1,700	2,100	120	150	3
Etowah silt loam:											
Undulating phase	35	55	15	24	2.6	3.4	1,400	1,800	85	130	4
Eroded undulating phase	32	53	14	23	2.5	3.3	1,300	1,700	80	125	4
Eroded rolling phase	30	50	13	22	2.4	3.1	1,200	1,600	70	115	9
Farragut silty clay loam:											
Eroded undulating phase	35	56	15	24	2.7	3.4	1,400	1,800	80	125	4
Eroded rolling phase	30	50	14	22	2.5	3.2	1,200	1,600	75	125	9
Farragut silty clay, severely eroded rolling phase	13	32	5	14	1.0	1.9			35	75	14

[1] Number of days 1 acre will graze an animal unit without injury to the pasture.

TABLE 7.—*Average acre yields of crops to be expected over a period of years on the soils of Bradley County, Tenn., under two levels of management*—Continued

Soil	Corn		Wheat		Alfalfa		Burley tobacco		Permanent pasture		Management group
	A	B	A	B	A	B	A	B	A	B	
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]	
Fullerton silt loam:											
Rolling phase	25	50	12	21	2.3	2.8	1,100	1,500	60	110	10
Eroded rolling phase	24	48	11	20	2.2	2.7	1,100	1,400	55	105	10
Eroded undulating phase	25	50	13	21	2.3	2.9	1,100	1,500	65	120	5
Eroded hilly phase	19	38	10	18	2.0	2.6	900	1,300	45	100	15
Fullerton silty clay loam:											
Severely eroded rolling phase	11	30	5	15	1.2	1.9			35	80	14
Severely eroded hilly phase			4	13	1.1	1.8			30	70	17
Fullerton cherty silt loam:											
Rolling phase	20	45	10	19	2.1	2.7	1,000	1,400	45	90	11
Eroded rolling phase	20	45	9	19	2.0	2.6	1,000	1,400	50	95	11
Hilly phase	18	36	9	17	1.9	2.5	900	1,300	40	90	15
Eroded hilly phase	17	36	8	17	1.8	2.4	900	1,300	35	90	15
Steep phase									35	75	20
Eroded steep phase									35	70	20
Fullerton cherty silty clay loam:											
Severely eroded rolling phase	10	27	5	14	1.2	1.8			35	80	14
Severely eroded hilly phase			4	13	1.1	1.8			30	70	20
Severely eroded steep phase									20	50	20
Fullerton loam:											
Eroded rolling phase	24	48	11	20	2.2	2.7	1,100	1,400	55	105	10
Eroded hilly phase	19	38	10	18	2.0	2.6	900	1,300	45	100	15
Greendale silt loam	32	55	15	24	2.5	3.2	1,600	2,100	95	145	3
Greendale cherty silt loam	25	48	11	20	2.2	2.9	1,100	1,500	75	105	3
Gullied land:											
Shale soil materials											20
Calcareous sandstone soil materials											20
Limestone soil materials											20
Hamblen silt loam	30	50		20					115	150	1
Hermitage silt loam:											
Undulating phase	38	60	16	25	2.8	3.5	1,500	1,900	90	130	4
Eroded undulating phase	36	58	15	24	2.7	3.4	1,400	1,800	85	130	4
Eroded rolling phase	30	52	14	23	2.4	3.2	1,200	1,600	75	120	9
Holston loam:											
Eroded undulating phase	22	48	11	20	2.1	2.6	1,000	1,400	60	110	5
Eroded rolling phase	19	40	9	17	1.9	2.4	800	1,300	50	90	10
Huntington silt loam	47	70	14	20	2.4	3.1	1,400	1,800	120	150	1
Huntington loam	46	69	14	20	2.4	3.1	1,400	1,800	115	145	1
Jefferson loam:											
Eroded undulating phase	22	48	10	20	2.0	2.5	1,000	1,500	40	100	5
Rolling phase	20	40	9	17	1.9	2.4	900	1,400	35	70	10
Eroded rolling phase	18	40	8	17	1.8	2.3	900	1,400	30	65	10
Leadvale silt loam:											
Undulating phase	22	44	11	18			1,000	1,400	65	120	6
Eroded undulating phase	20	42	10	17			900	1,400	60	115	6
Eroded rolling phase	18	40	8	15			800	1,300	50	105	12
Lehew-Montevallo loams:											
Hilly phases			6	15					35	75	18
Eroded hilly phases			5	14					30	70	18
Rolling phases	16	25	9	18	1.4	1.8			40	80	16
Eroded rolling phases	14	22	8	17	1.3	1.7			35	80	16
Steep phases											20
Eroded steep phases											20
Lindside silt loam	35	55							105	135	1
Litz shaly silt loam:											
Rolling phase	17	27	9	18	1.7	2.2			45	90	16
Eroded rolling phase	15	25	8	18	1.5	2.0			40	90	16
Eroded undulating phase	18	30	10	19	1.9	2.4			55	95	16
Hilly phase	15	24	8	17	1.6	2.1			40	80	18
Eroded hilly phase	12	20	6	15	1.0	1.5			35	80	18
Melvin silt loam		40							40	110	19
Mines, pits, and dumps											20
Minvale silt loam:											
Undulating phase	29	54	16	24	2.6	3.2	1,300	1,700	75	130	5
Eroded undulating phase	27	52	15	23	2.5	3.1	1,200	1,600	70	125	5
Rolling phase	26	51	13	22	2.4	3.0	1,100	1,500	65	120	10
Eroded rolling phase	25	50	12	21	2.3	2.8	1,000	1,400	60	115	10

TABLE 7.—*Average acre yields of crops to be expected over a period of years on the soils of Bradley County, Tenn., under two levels of management*—Continued

Soil	Corn		Wheat		Alfalfa		Burley tobacco		Permanent pasture		Management group
	A	B	A	B	A	B	A	B	A	B	
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Lb.*	*Lb.*	*Cow-acre-days*[1]	*Cow-acre-days*[1]	
Minvale cherty silt loam:											
Rolling phase	22	47	12	21	2.2	2.8	1,100	1,500	55	105	11
Eroded rolling phase	21	46	11	20	2.1	2.7	1,000	1,400	50	100	11
Monongahela silt loam, undulating phase	20	35	11	18					65	120	6
Montevallo shaly silt loam:											
Rolling phase	16	25	9	18	1.5	1.9			40	85	16
Eroded rolling phase	14	23	8	17	1.4	1.8			35	80	16
Eroded undulating phase	17	29	10	19	1.6	2.1			50	90	16
Hilly phase			7	16					35	75	18
Eroded hilly phase			6	15					30	70	18
Montevallo and Muskingum soils:											
Rolling phases	16	25	9	18	1.5	1.9			40	85	16
Hilly phases			7	16					35	75	20
Steep phases											20
Mullins silt loam		32							30	65	19
Muse silt loam:											
Undulating phase	26	52	14	23	2.0	2.4	1,200	1,600	70	125	5
Eroded undulating phase	24	50	12	21	1.8	2.2	1,100	1,600	65	120	5
Rolling phase	21	47	11	20	1.5	2.0	1,000	1,500	60	105	10
Eroded rolling phase	20	45	9	18	1.3	1.8	900	1,400	55	100	10
Eroded hilly phase	16	35	9	17	1.1	1.6	800	1,600	55	95	15
Neubert loam	42	63	16	24	2.3	3.0	1,700	2,100	110	145	3
Pace silt loam:											
Undulating phase	25	52	13	23	2.4	3.0	1,300	1,700	80	120	6
Eroded undulating phase	24	50	12	22	2.3	2.9	1,200	1,700	75	120	6
Eroded rolling phase	22	42	11	20	2.0	2.5	1,100	1,600	65	115	10
Pace cherty silt loam:											
Rolling phase	18	40	10	19	2.0	2.6	1,100	1,500	55	95	11
Eroded rolling phase	17	37	9	18	1.8	2.4	1,000	1,500	50	95	11
Prader silt loam		40							40	110	19
Purdy silt loam		25							25	60	19
Rockland, limestone											20
Sequatchie loam, undulating phase	35	57	14	23	2.7	3.5	1,400	1,900	70	110	5
Sequoia silt loam:											
Undulating phase	25	45	14	23	2.5	3.0	1,000	1,400	70	105	8
Rolling phase	22	38	11	20	2.3	2.8	800	1,200	60	95	12
Sequoia silty clay loam:											
Eroded undulating phase	23	43	12	22	2.4	2.9	900	1,300	65	100	8
Eroded rolling phase	20	36	10	19	2.1	2.6			55	90	12
Sequoia silty clay, severely eroded rolling phase	11	23	5	13	1.1	1.8			30	75	16
Staser silt loam	47	70	14	20	2.4	3.1	1,400	1,800	120	150	1
Staser loam	45	68	14	20	2.3	3.0	1,300	1,700	115	145	1
Stony rolling and hilly land, limestone									28	58	17
Talbott silty clay loam:											
Eroded undulating phase	25	48	14	23	2.6	3.1	1,000	1,400	75	110	8
Eroded rolling phase	23	40	12	21	2.4	2.9	900	1,300	65	100	12
Talbott silty clay, severely eroded rolling phase	13	25	5	14	1.2	2.0			35	80	14
Tellico fine sandy loam:											
Eroded rolling phase	28	50	13	22	2.3	3.0	1,200	1,600	70	115	10
Eroded hilly phase	20	40	11	19	2.2	2.9	900	1,700	60	100	15
Steep phase									40	80	20
Eroded steep phase									35	75	20
Tellico clay loam:											
Severely eroded hilly phase			5	14	1.1	1.8			30	70	17
Severely eroded steep phase									20	60	20
Tellico silt loam, eroded rolling phase	32	54	15	24	2.5	3.2	1,200	1,600	75	120	10
Tellico silty clay loam, severely eroded hilly phase			6	15	1.2	1.9			35	75	17
Tyler silt loam		32							30	65	7
Waynesboro loam, eroded rolling phase	29	50	13	22	2.3	3.0	1,200	1,600	70	115	10
Waynesboro cobbly loam:											
Eroded rolling phase	26	47	10	19	2.1	2.8	1,100	1,500	65	110	10
Eroded hilly phase	16	35	7	15	2.0	2.7	800	1,600	50	90	15
Whitwell loam	25	40	11	19					70	125	7
Wolftever silt loam, undulating phase	25	45	11	20	1.6	2.4	1,200	1,600	65	110	6

[1] Number of days 1 acre will graze an animal unit without injury to the pasture.

County, and shown on the colored map at the back of the report, are described in the following pages. More detailed knowledge of the soils in these associations can be obtained by studying the detailed soil map and the descriptions of the soils.

1. Litz-Sequoia-Cotaco

This soil association covers only about 4.0 percent of the county area. It occupies undulating to hilly, but predominantly rolling, valley positions and overlies shale. It occurs on the eastern edge of the county along South Chestuee Creek.

In some places the material is somewhat thicker over bedrock than in others, especially where the Sequoia soils occur.

The Litz soils are on the stronger slopes, where the soil material over bedrock is thin. Cotaco soils occupy strips along the intermittent drainageways, and Staser, Hamblen, Prader, and Monongahela soils occur along the major drainageways. The Staser, Hamblen, and Prader soils are on the nearly level bottom lands, and the Monongahela soil is on the nearly level to undulating stream terraces.

Most of the crops are grown on the Sequoia, Staser, Hamblen, and Monongahela soils. The Litz soils are low in fertility and droughty. The Prader soil is poorly drained. The Staser and Hamblen soils are somewhat limited in use suitability by the risk of flooding.

This association is well suited to general farming. Many different crops are grown. The level of management is generally not high. On much of the association the more exacting legumes and grasses can be grown, if the fertility is brought to a high level. Because of erosion, productivity has been greatly lowered on much of the acreage. In the more shallow parts, suitability for agricultural use is limited to pasture or forest. Water control is a serious problem, and moderately long rotations are needed to control soil losses. Heavy fertilization is usually needed.

2. Montevallo-Apison-Cotaco

This soil association consists mainly of soils formed from shallow material that overlies acid shale or interbedded acid shale and sandstone. It occupies about 11.5 percent of the county and occurs in three areas. The largest of these areas is in the eastern part of the county. One small area is along Lick Creek, and the other area occupies a long narrow strip west of South Mouse Creek.

The association consists chiefly of rolling to hilly uplands and of a small proportion of nearly level land along the streams. Montevallo soils predominate, and Apison soils are next in acreage. The uplands also include a considerable acreage of Litz and Sequoia soils. The Montevallo and Litz soils occupy the undulating to rolling areas. Some areas of Leadvale and a lesser acreage of Muse soils occupy old colluvial positions. Cotaco soils lie along the intermittent drainageways, and Staser, Hamblen, and Prader soils occupy the nearly level areas along the larger streams. There is a small acreage of Holston and Monongahela soils on high and moderately high stream terraces.

Farms in this association are chiefly of the small general farming or the subsistence type. The general level of fertility is low; usually management is not at a high level. Most of the acreage is in unimproved pasture containing a high percentage of broomsedge. Steep areas are mainly in cutover timber consisting of a mixture of oak and pine. Cultivated crops are chiefly on soils of the Apison, Leadvale, Muse, and Cotaco series, and on bottom lands and stream terraces. Small grains, corn, and cotton are the principal crops. There is very little alfalfa. A considerable acreage of lespedeza and some crimson clover are grown. Fertilizers are used on most crops, but the use of systematic rotations and of winter cover crops is not common.

The selection of type of farming is limited because there is not sufficient acreage that can be adapted to crops. The large acreage of potential pastureland is droughty and low in fertility. The fertility level is difficult to raise and to maintain; pasture is difficult to establish.

3. Cumberland-Etowah-Sequatchie

This soil association occupies about 2.0 percent of the county. It occurs on stream terraces, first bottoms, and some of the bluffs along the Hiwassee River. The greater part of the association is on high river terraces, which are occupied by Cumberland and Etowah soils and to some extent by Holston and Waynesboro soils. The Sequatchie soils are on lower terraces nearer the Hiwassee River. Staser and Bruno soils and some areas of Hamblen and Huntington soils are on the nearly level river bottoms. Fullerton soils occupy most of the river bluffs.

This is one of the more prosperous farming areas in the county. The farms are fairly large and are chiefly of the general type. There are a few dairy farms. Corn, cotton, small grains, and hay are the principal crops. The general fertility is high, and much of the acreage is well suited to intensive production of row crops. Alfalfa and other more exacting crops are suited to most of the soils. Management requirements are not so exacting as in the other soil associations.

4. Montevallo-Muskingum-Jefferson-Barbourville

This soil association occupies about 4.0 percent of the county. All of it lies in one area in the western part. The soil association is known locally as White Oak Mountain. It is narrow and elongated and consists mainly of hilly and steep uplands. Steep slopes predominate. Undulating and rolling land is confined chiefly to the narrow ridge crests and to areas along small drainageways.

The soils are light colored and shallow to bedrock of sandstone and shale. In most places the bedrock is no more than 12 to 15 inches below the surface. The Montevallo and Muskingum soils occupy practi-

cally all of the uplands, although a few of the ridges are capped with cherty Fullerton and Clarksville soils. The Jefferson and Muse soils occupy most of the footslope positions. Barbourville soils are along drainageways.

A large part of this association is still in forest that has been cut over many times. Some areas have been cleared but are now reverting to forest. Most of the soils in this association are poorly suited to crops and pasture because of their droughtiness, steep slopes, and shallow depth to bedrock. Suitable cropland is confined largely to the foot slopes, benches, and narrow areas along drainageways. A few areas of the less steep uplands are being used for pasture, but stands are difficult to establish and to maintain. The areas along the drainageways are used rather intensively for row crops, hay, and pasture. These areas and those on foot slopes are potentially productive of many different crops.

This association is thinly populated. The steep slopes preclude the use of most farm machinery, and most of the farms are of the type producing mainly for home use.

5. Sequoia-Talbott-Colbert

This soil association occupies about 1.8 percent of the county. It occurs as a narrow area surrounding the Tellico-Alcoa-Neubert soil association, and it includes small areas of soils of the kind in that association. The association is predominantly rolling. About 50 percent of the acreage is shallow or relatively shallow to bedrock. Sequoia soils predominate, but Talbott soils are extensive. The Colbert soils are the least extensive.

In this association there is also a considerable acreage of Alcoa soil. This soil is on old colluvium and alluvium washed from the Tellico soils in the adjacent association. There is also a small acreage of Dandridge and Dewey soils and of gullied land. Throughout the association there is much Hermitage soil. This soil is on old colluvium and alluvium washed from soils underlain by limestone. A small acreage of Neubert and Lindside soils lies along the drainageways.

The principal soils are moderately well suited to crops or pasture. They are used chiefly for corn, small grains, and hay. Generally, they are best for small grains, hay, or pasture. Because of erosion the general level of fertility is low. Some severely eroded areas are reverting to forest.

Farms in this association are of a general type. Management requirements are exacting, because the soils are highly susceptible to erosion.

6. Fullerton-Clarksville-Greendale

This soil association is the largest; it occupies about 23.2 percent of the county. It is widely distributed, but most of it is on several chert ridges that traverse the central part of the county. Fullerton soils predominate. The relief ranges from undulating to steep but is generally rolling to hilly. The Fullerton and Greendale soils occupy much of the smoother acreage, and only a few areas are occupied by Clarksville, Bolton, and Minvale soils. The Clarksville soils are common in the hilly parts, but the Fullerton soils predominate. There is a small acreage of hilly Bolton soil. Pace and Minvale soils occur throughout the association. Lindside and Melvin soils are along the major drainageways.

Most of the soils have moderate to low fertility, are well drained, and are deep to bedrock. Gentle and moderate slopes generally are cleared and used for general farm crops, mainly corn, cotton, hay, and small grains. Areas not in crops or forested are used for pasture. Pastures need heavier fertilization than on soils of the Dewey-Fullerton-Emory soil association.

7. Tellico-Alcoa-Neubert

This soil association occupies about 4.0 percent of the county. It occurs in two long narrow areas in the southern and in the eastern parts of the county. It consists of hilly to steep soils that are relatively shallow to calcareous sandstone, reddish in color, and sandy and permeable.

Much of the association is covered by cutover mixed deciduous and pine forest. Most of the cleared acreage is on the bottom lands along streams. Because of the strong slopes, shallow depth to bedrock, and susceptibility to erosion, this association has limited suitability. It is largely in forest. Only very limited acreage made up of smooth deep soils on the uplands and of soils on the bottom lands is well suited to crops.

Much of the acreage is used for unimproved pasture or is reverting to pine forest. There is a large acreage of gullied land that is also reverting to forest. Few homes are in this association.

8. Sequoia-Farragut-Hermitage

This soil association covers about 11.5 percent of the county. It occurs in valleys, and the relief is predominantly undulating to rolling. Soils having dark surface layers and red or reddish subsoils predominate. These soils have formed from materials relatively deep over acid shale and from materials that formed on colluvial lands. Originally, the shale contained some lime, but it is now free of carbonates to a great depth.

On the uplands the Sequoia and Farragut soils occupy about equal acreages, but in some areas the Sequoia acreage is more extensive. The Hermitage soils occur on old colluvium and alluvium accumulations. They are widely distributed throughout the association, but they are not so extensive as the Sequoia or Farragut soils. On local accumulations of alluvium and colluvium adjacent to drainageways and in depressions, there is a large acreage of Emory soil. Litz, Cotaco, Staser, Hamblen, and Prader soils occupy a minor acreage.

Corn, small grains, and hay are the principal crops.

Some of the soils are suited to intensive cropping, but most of them are moderately susceptible to erosion and not suited to intensive use. Rotation pasture is used on a large acreage.

In this association general farming predominates, but there are also many dairy and beef-cattle farms. Their number is increasing. The general fertility level is moderate. Soil management is at a fairly high level, considering that the soils are fairly difficult to manage. Some of the best farms and larger dwellings are in this association.

9. Lehew-Montevallo-Cotaco

This soil association occupies about 21.0 percent of the county. It consists mostly of hilly and steep Lehew and Montevallo soils, which are mapped together as soil complexes. They are shallow to bedrock, low in fertility, and predominantly strongly acid. The narrow valleys are in places occupied by Cotaco and Hamblen soils. The limited areas occupied by Cotaco and Hamblen soils and the few other soils consisting of local and general alluvium are suitable for crops, but their general level of fertility is low. Some areas of Jefferson, Muse, and Leadvale soils and of gullied land occur in the association.

Most of this association is wooded and should remain wooded. It has little value for crops and pasture. Only a small part is used for crops, chiefly oats, small grains, and cotton. There is much potential pastureland, but because of the droughtiness, low fertility, and erodibility of the soils, pasture is difficult to establish and to maintain. Only the less exacting legumes and grasses are suited. Generally management is difficult and at a low level.

Farms in this association are about the poorest in the county. In those parts cleared for crops, the farmers grow crops mainly for use of the farm household. The farmers are handicapped by not having enough acreage to grow the food they need. Farm homes are generally not large and have few modern conveniences.

10. Talbott-Colbert-Stony land

This soil association occupies about 2.0 percent of the county area. One area is along the west side of the county near the base of White Oak Mountain; the other is in the northwestern corner. The relief is predominantly rolling, but the range is from undulating to hilly.

This association consists chiefly of soils formed from materials that are shallow or relatively shallow over clayey limestone. In the uplands Talbott and Colbert soils predominate.

Small areas of Stony rolling and hilly land, limestone, and of gullied lands occur throughout the association. Lindside silt loam, a somewhat poorly drained nearly level soil, occurs in first bottoms near streams. Areas of Cumberland and Etowah soils occupy high stream terraces.

The small-scale general type of farm predominates. The fertility level of the soils is moderately low. Little of the acreage is well suited to the intensive use of crops. Management is difficult and is not at a high level.

11. Apison-Sequoia-Leadvale

This association covers about 14.0 percent of the county. It occurs in one area, which is mainly in the drainage basin of Coahulla Creek in the south-central part of the county.

The soil association consists mainly of soils ranging from very shallow to very deep to bedrock. The relief is predominantly undulating, but the range is from nearly level to hilly. Most of the acreage has been cleared at some time. Much of the association is in unimproved pasture or idle. A relatively high percentage of it, however, is in timber.

Apison soils occupy most of the undulating areas, and Apison and Sequoia soils occupy about equal acreages on the rolling areas. Leadvale soils occupy undulating to rolling areas of colluvium. In this association Litz soils occupy the relatively small acreage of the hilly areas. Cotaco soils occur in long narrow areas along intermittent drainageways, and the Hamblen soil occupies nearly level bottom lands.

This association is poor for agriculture. The farms are small and of either the general type or of the type producing mainly for use of the farm family. The level of fertility is lower than for most of the other associations.

12. Dewey-Fullerton-Emory

This soil association occupies only about 1.0 percent of the county. It occurs in two areas, one along the Southern Railway near Tasso, and the other along Chatata Creek. The relief is predominantly rolling, but the range is from nearly level to hilly. The nearly level areas are along the major drainageways. The acreage of hilly land is small. Fullerton soils predominate, but, intermixed, there is much acreage of Dewey and Decatur soils. Emory and Greendale soils are along intermittent drainageways. There is also a considerable acreage of Hermitage soils on colluvial slopes and some acreage of Huntington, Lindside, and Melvin soils on the bottom lands.

The soils of the uplands are well suited to intensive cropping. They are suitable for the more exacting legumes and grasses and many other crops. For high yields of most crops, most of the soils need lime and fertilizer. Corn, small grains, and hay are the principal crops. Some cotton is grown as a cash crop. A small acreage of tobacco is grown, chiefly on soils of the colluvial slopes. Most of the bottom lands are in permanent pasture.

Dairy farming prevails, and the general level of fertility is about medium. Erosion has much reduced the general fertility, and erosion control is one of the major problems on most of these soils.

Forests of Bradley County[6]

This section reports on the forest resources of Bradley County; the types of forest that grow on the various soil associations, or broad patterns of soils; and the methods of forest management that would improve yields of forest products.

Forest Resources

According to the 1945–46 appraisal made by the American Forestry Association and the State Conservation Department (*4*), approximately 48 percent of Bradley County is forested. The forested acreage is divided as follows: Farm woodland, 65 percent, and nonfarm forest, 35 percent. The appraisal divides the forest in this way: Yellow pine-hardwoods, 83 percent; upland hardwoods, 9 percent; yellow pines, 7 percent, and cedar hardwoods, 1 percent.

The 1945–46 appraisal reports development of timber in the total forested area thus: Cordwood, 73 percent; sawtimber, 19 percent; and below cordwood, 8 percent.

The 1945–46 appraisal reports a sawtimber volume of 124,395 M board feet, broken down as follows: Hardwoods, 53,717 M board feet, and softwoods, 70,678 M board feet. The volume of sawtimber is 1,208 board feet an acre. The total annual timber growth for all sizes is 165 feet an acre.

For 1946, the TVA Division of Forestry Relations reported 62 mills producing 22,455 M board feet of lumber and ties, and the volume of stumpage cut as 19,926 M board feet (*10*).

Forest Types by Soil Associations

The purpose of the following paragraphs is to explain the kinds of forests that grow on the different soil associations in the county. The map of the soil associations in the back of this report will be useful in tracing the extent of the various forest types.

In this county the yellow pine-hardwoods type of forest is dominant on most of the soil associations. Other forest types occur, however, with the dominant type. These are the upland hardwoods, the cedar-hardwoods, and the yellow pine forest types.

Litz-Sequoia-Cotaco association.—This soil association is severely eroded, and the forest type is the yellow pine-hardwoods. The kinds of trees are much the same as will be mentioned for other soil associations occupied by the yellow pine-hardwoods type of forest.

Montevallo-Apison-Cotaco association.—This association has a better developed, more closely stocked yellow pine-hardwoods forest than the Litz-Sequoia-Cotaco association. The mixed stands, mainly of conifers and deciduous hardwoods, are made up of loblolly, shortleaf, and Virginia pines; Southern red, white, black, post, and scarlet oaks; hickory; and sourwood. Dogwood grows on the steeper slopes. The areas of this association that are most seriously eroded through poor soil management have been seeded to pine.

Figure 7.—**Rugged terrain of White Oak Mountain. The forest is chiefly oak and shortleaf pine.**

Cumberland-Etowah-Sequatchie association. — This association is primarily cropland and pasture. Before it was cleared, it supported trees of the yellow pine-hardwoods forest type. Some of the eroded areas were planted to pines by the Civilian Conservation Corps. These plantings have formed fully stocked stands that are approaching the proper size for thinning.

Montevallo-Muskingum-Jefferson-Barbourville association.—This association supports the yellow pine-hardwoods type of forest. On the areas predominantly wooded, the stand is made up of oak, hickory, yellow-poplar, blackgum, sourwood, dogwood and other associated hardwoods, along with shortleaf, Virginia, and loblolly pines (fig. 7).

The different kinds of trees occur in characteristic sites, according to their preference for soil, moisture, and slope. For example, chestnut oak prefers the south- and west-facing slopes of the Muskingum soils. Yellow-poplar grows along drainageways on areas of Barbourville soils. Northern red oak prefers north- and east-facing slopes.

Sequoia-Talbott-Colbert association.—The yellow pine-hardwoods type of forest occupies this association. On the Colbert soils of this association, the quality, form, and stocking of forest trees is below average for the county. On soils of this association there is redcedar, along with an open growth consisting of Virginia, shortleaf, and loblolly pines, and of elm, hickory, redbud, dogwood, persimmon, and other scrubby hardwoods. The redcedar is mostly on the Colbert soils.

Fullerton-Clarksville-Greendale association. — This association, one of the more heavily wooded parts of the county, is occupied by the yellow pine-hardwoods forest type. The pines—shortleaf, loblolly, and Virginia—grow in association with hardwoods, among which are scalybark (shagbark) hickory, white hickory, scarlet, Northern red, black, post, and white oaks, yellow-poplar, blackgum, and dogwood.

The Gullied land, limestone materials, in this association has revegetated to Virginia, shortleaf, and lob-

[6] This section was prepared by G. B. Shivery, extension forester, University of Tennessee.

lolly pines and a scattering of redcedar, hickory, red oak, redbud, persimmon, and elm. The moist and somewhat poorly drained areas in this association support blackgum, sweetgum, white ash, willow oak, and similar water-tolerant trees.

Tellico-Alcoa-Neubert association.—For the most part, the association is covered by trees of the yellow pine-hardwoods forest type. On typical areas of Tellico soil in the northeastern part of the county, the growth includes shortleaf, loblolly, and Virginia pines, hickory, Southern red, post, black, and white oaks, sourwood, dogwood, blackgum, and red maple. On the north- and east-facing slopes are Northern red oak and yellow-poplar. On the drier south and west exposures are principally chestnut and scarlet oaks, sourwood, and scalybark (shagbark) hickory. The Tellico soils have unfavorable relief and are extremely erodible, so they should remain in forest unless they are to be carefully managed.

Eastward from United States Highway No. 60 to a point near the Tennessee-Georgia boundary, this soil association has a percentage of loblolly pine high enough to allow classifying the growth as of the yellow pine forest type.

Sequoia-Farragut-Hermitage association.—Not much of this association is wooded. Generally, the trees are of the kinds typical for the yellow pine-hardwoods forest type. Some of the severely eroded areas were planted to pine in the 1930's by the Civilian Conservation Corps. These plantings have produced thrifty stands now nearing the stage of growth suitable for thinning.

Lehew-Montevallo-Cotaco association.—For the most part, this association is occupied by the yellow pine-hardwoods forest type. Some areas, however, have the upland hardwoods forest type, and others have pure stands of the yellow pine forest type.

In the yellow pine-hardwoods forest type, the deciduous hardwoods are members of the red oak and white oak groups. These hardwoods are hickory, yellow-poplar, blackgum, basswood, and associated species. The conifers in the yellow pine-hardwoods forest type are loblolly, shortleaf, and Virginia pines.

Where the amount of pines is less than 25 percent of the dominant and codominant stems, the forest classifies as the upland hardwoods forest type. Likewise, where loblolly, shortleaf, and Virginia pines, individually or in mixture, form at least 75 percent of the dominant and codominant stems, the growth classifies as the yellow pine forest type.

Talbott-Colbert-Stony land association.—The yellow pine-hardwoods type of forest occupies this soil association. Redcedar is common, and so are white ash, scalybark (shagbark) hickory, pignut hickory, redbud, shortleaf pine, elm, dogwood, and Virginia pine. A few loblolly pines grow in places. The forest is scattered and open, and in many places the trees are short and stunted.

Apison-Sequoia-Leadvale association.—Much of this association is wooded or forested. It supports the yellow pine-hardwoods type of forest. The stands are made up of various mixtures of Southern red, black, white, and post oaks, pignut hickory, yellow-poplar, other hardwoods, and Virginia, loblolly, and shortleaf pines. On the moist somewhat poorly drained areas in this soil association are blackgum, sweetgum, white ash, willow oak, and similar water-tolerant trees.

Dewey-Fullerton-Emory association.—This association is good agricultural land. The few trees are scattered along waterways. Plantings of pines made by the Civilian Conservation Corps occupy a few small severely eroded areas.

Forest Management

Forest management, particularly management of farm woodland, consists of these essential practices: (1) Prevention of fire; (2) prohibition or control of grazing by livestock; (3) thinning of stands of pine, whether planted or natural, at a stage favoring growth of high-value poles, sawlogs, and other forest products; and (4) proper methods of reforestation.

Fire prevention.—Fire control is needed to protect the forests and also to check erosion and to maintain the porosity of the soils. One mobile fire-suppression crew operates from the 80-foot steel tower on White Oak Mountain, and the 80-foot steel tower near Charleston is the meeting place for a mobile crew. Both of these towers have short-wave radios. In the south-central part of the county is a 40-foot temporary wood tower used as an observation point. A land company with holdings in the county has a mechanized fire-plow unit and offers active assistance in control of fires.

According to the Division of Forestry, State Department of Conservation, brush burning is the leading cause of fires. Incendiarism, campfires, smoking, and fires to smoke out game are other important causes.

Control of grazing.—Grazing by livestock is an undesirable practice on many farm woodlands. Control of grazing is necessary to protect the trees. Furthermore, according to experiments in Indiana, woodland grazing does not pay. Animals grazed on woodland at intensities of 2, 4, or 6 acres allowed per animal unit, without supplementary feeding, caused serious deterioration of the animals within a 6-month season (*5*). Repeated browsing gradually destroys ability of the forest to produce timber and finally curtails reproduction to such extent that natural regeneration of the stand is prevented. Trampling livestock compact the soil, disturb the humus, and impair soil porosity and thereby lessen water absorption.

Thinning forest stands.—Radical changes in management must be made to halt the progressive deterioration of forests. This can be done by placing a much greater value on the potential crop of trees of sawtimber size. The cutover woodland and forest contain many cull trees that hinder the development of the potential crop trees. Farm woodland can be materially improved by using cull trees for fuel and other minor farm needs or for pulpwood. The vigorous trees, freed of competition from the culls, can then grow into more valuable products. Such improvement calls for systematic deadening or cutting of the

crooked, short, bushy-topped, unsound, or slow-growing trees and letting the straight, tall, well-crowned trees that are free from defect grow into crop timber.

Good thinning practices can be described by taking the plantings set out by the Civilian Conservation Corps as an example. The pine seedlings were planted in the 1930's at an approximate rate of 1,000 to the acre. These plantations, in 1955, are approaching the thinning stage. The crowns of the trees are interlaced in some places, close spacing has prevented branches down on the trunks, and core samples taken show that growth in diameter of the trees has slowed down.

A stand of this kind needs to be thinned to assure ample growing space for the remaining trees. The first thinning, preferably made when the plantation is 18 years old, removes 30 to 40 percent of the wood volume. When the trees are about 25 years old, a second thinning can be made, and more pulpwood can be harvested than in the first thinning.

When the trees are 35 to 40 years old, they should yield some poles or piling, which are more valuable than the pulpwood. At the age of 65 years, the fourth and final harvest can be made. It will consist of choice sawlog trees and will be the chief source of income for the plantation. The yield at this age would be about 20 M board feet per acre.

Reforesting.—Natural reproduction and seeding is the preferable method of reforestation, but planting will be necessary for some areas, especially those that have been severely eroded.

Successful planting of forest trees requires advance preparation, which may include breaking and mulching galled areas, building simple, low checkdams of brush in gullies, and plowing contour furrows. The amount of preparation needed will depend on the site chosen for planting.

Selection of suitable kinds of trees is a part of preparation for planting. Past experience in planting will serve as a guide. According to records of the Division of Forestry Relations, Tennessee Valley Authority, plantings from stock furnished by the TVA, up to June 30, 1955, covered 3,968 acres in a total of 440 projects. In the past, seedlings of shortleaf, loblolly, and Virginia pines, black locust, and yellow-poplar were planted. The seedlings now planted are almost entirely loblolly pine.

Loblolly pine will grow in practically all sites in need of artificial planting. The seedlings generally are available from nurseries operated by the State or the Tennessee Valley Authority. Loblolly pine is preferable to shortleaf pine, because it grows more rapidly and adapts better to varied conditions of erosion and moisture supply.

As before mentioned, natural reseeding is preferable to planting, and it should be encouraged on all soils not needed for crops and pasture. The pines—loblolly, shortleaf, and Virginia—will grow better on the poorer soils than the hardwoods. Generally, then, the pines are the best choice for reforestation. If oaks, yellow-poplar, or other hardwoods suitable for timber establish themselves in a site that will allow good growth, it may be best to favor them over the pines. If redcedar reseeds on Rockland, limestone; Stony rolling and hilly land, limestone; and on soils of the Sequoia-Talbott-Colbert and the Talbott-Colbert-Stony land associations, it should not be discriminated against. These are the soils on which redcedar naturally makes favorable growth. Occasionally, black locust volunteers on areas of Tellico soil that have been mismanaged or unwisely cleared. The locust may provide fence posts, but pines would be preferable.

The following soils and miscellaneous land types need reforestation:

- Fullerton cherty silty clay loam, severely eroded steep phase.
- Gullied land, shale soil materials.
- Gullied land, calcareous sandstone soil materials.
- Gullied land, limestone soil materials.
- Lehew - Montevallo loams, eroded hilly phases.
- Lehew - Montevallo loams, eroded steep phases.
- Mines, pits, and dumps.
- Tellico fine sandy loam, eroded steep phase.
- Tellico clay loam, severely eroded steep phase.

If a high level of management for crops or pasture cannot be attained, the following soils can be reforested:

- Apison silt loam, severely eroded rolling phase.
- Bolton silt loam, eroded steep phase.
- Cumberland silty clay loam, severely eroded hilly phase.
- Dandridge shaly silt loam, eroded hilly phase.
- Dandridge shaly silt loam, eroded steep phase.
- Fullerton silty clay loam, severely eroded hilly phase.
- Fullerton cherty silt loam, eroded steep phase.
- Fullerton cherty silty clay loam, severely eroded hilly phase.
- Lehew - Montevallo loams, eroded rolling phases.
- Litz shaly silt loam, eroded rolling phase.
- Litz shaly silt loam, eroded hilly phase.
- Montevallo shaly silt loam, eroded rolling phase.
- Montevallo shaly silt loam, eroded hilly phase.
- Sequoia silty clay, severely eroded rolling phase.
- Talbott silty clay, severely eroded rolling phase.
- Tellico clay loam, severely eroded rolling phase.
- Tellico silty clay loam, severely eroded hilly phase.

Indirect Benefits from Proper Forest Management

Aside from the production of wood products, forests provide important indirect benefits, especially for areas subject to serious erosion. A protective layer of forest litter absorbs the impact of the falling drops of water and preserves the tiny pores and channels between the soil particles that allow water to move downward readily. Fungi, bacteria, and tiny animals that consume the litter and one another produce a dark-brown colloidal substance called humus. If carried downward into the mineral soil by percolating water, the humus improves both physical structure and fertility. In addition, this litter and the humus have a great ability to absorb water directly. Porosity is increased, because channels are left where roots die and decay. The surface roots of forest plants help to bind the soil. The densest network occurs in the lower part of well-developed layers of litter.

Tests on an unburned plot near Statesville, N. C., in the 9-year period 1932–40, show average losses of 0.06 percent of rainfall and 0.001 ton of soil per acre. A companion woodlot, burned twice yearly during the same 9-year period, shows losses of 11.5 percent of rainfall and 3.08 tons of soil per acre (*3*).

Experiments at Zanesville, Ohio, for a 9-year period on cultivated land, pasture, and woodland, show the runoff as 20.6 percent, 13.8 percent, and 3.2 percent, respectively, and soil loss an acre as 17.18 tons, 0.10 ton, and 0.01 ton (*2*). Therefore, both erosion control and maximum moisture absorption result from complete forest cover. This happens because soil under old-growth forest is more porous and absorbs water much more rapidly than soil in cultivated fields. Where the forest cover is properly maintained, soil under second-growth forest does not lose its porosity unless it is overgrazed or the litter is destroyed by fire (*1*).

Glossary

Acidity. The degree of acidity or alkalinity of the soil mass expressed in words and pH values:

Extremely acid	below 4.5	Neutral	6.6–7.3
Very strongly acid	4.5–5.0	Mildly alkaline	7.4–7.8
Strongly acid	5.1–5.5	Moderately alkaline	7.9–8.4
Medium acid	5.6–6.0	Strongly alkaline	8.5–9.0
Slightly acid	6.1–6.5	Very strongly alkaline	9.1 and higher

Alluvium. Sand, mud, or other sediments, deposited on land by streams.

Bedrock. The solid rock underlying soils.

Clay. Particles of mineral soil less than 0.002 mm. (.000079 in.) in diameter.

Colluvium. Mixed deposits of soil material and rock fragments, near the base of rather strong slopes, that have been moved by gravity. The deposits have accumulated through soil creeps, slides, and local wash.

Consistence, soil. The attributes of soil material that are expressed by the degree and kind of cohesion and adhesion or by the resistance to deformation or rupture. Terms commonly used to describe consistence in this report are: *Brittle, compact, firm, friable, loose, plastic, very compact, very firm, very friable,* and *very plastic.*

Brittle. Term used to describe a soil that, when dry, will break with a sharp, clean fracture, or, if struck a sharp blow, will shatter into cleanly broken hard fragments.

Compact. Dense and firm but without any cementation.

Firm. Soil material crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Friable. Soil material crushes easily under gentle to moderate pressure between thumb and forefinger and coheres when pressed together.

Loose. Noncoherent.

Plastic. Wire formable and moderate pressure required for deformation of the soil mass.

Very compact. Very dense and very firm but without cementation.

Very firm. Soil material crushes under strong pressure; barely crushable between thumb and forefinger.

Very friable. Soil material crushes under very gentle pressure, but coheres when pressed together.

Very plastic. Wire formable and much pressure required for deformation of the soil mass.

Contour tillage. Furrow plowed at right angles to the direction of slope, at the same level throughout, and ordinarily at comparatively close intervals.

Cropland. Land regularly used for crops, except forest crops. It includes rotation pasture, cultivated summer fallow, or other land ordinarily used for crops but temporarily idle.

Erosion, soil. The wearing away or removal of soil material by water or wind.

Forest. Land not in farms, bearing a stand of trees of any age or stature, including seedlings (reproduction), but of species attaining a minimum average height of 6 feet at maturity; or land from which such a stand has been removed but is not now restocking and on which no other use has been substituted. Forest on farms is called farm woodland or farm forest.

Fertility, soil. The quality that enables a soil to provide the proper compounds, in the proper amounts and in the proper balance, for the growth of specified plants when other factors such as light, temperature, and the physical condition of the soil are favorable.

First bottom. The normal flooded plain of a stream subject to frequent or occasional flooding; land along a stream that is subject to overflow.

Green manure crop. Any crop grown and plowed under for the purpose of improving the soil, especially by the addition of organic matter.

Internal drainage. That quality of a soil that permits the downward flow of excess water through it. Terms for expressing internal drainage: *Very rapid, rapid, medium, slow, very slow,* and *none.*

Leaching, soil. Removal of materials in solution.

Mottling, soil. Contrasting color patches that vary in number and size. Descriptive terms are: Contrast—*faint, distinct,* and *prominent;* number—*few, common,* and *many;* and size—*fine, medium,* and *coarse.* The size measurements are as follows: *Fine,* commonly less than 5 mm. (about 0.2 in.) in diameter along the great dimension; *medium,* commonly ranging between 5 and 15 mm. (about 0.2 to 0.6 in.) along the greatest dimension; and *coarse,* commonly more than 15 mm. (about 0.6 in.) along the greatest dimension (*9*).

Natural drainage. Refers to drainage that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be due to other causes, as natural deepening of channels, filling of depressions, or blocking of drainage outlets. The following terms are used to express natural drainage: *Excessively drained, somewhat excessively drained, well drained, moderately well drained, imperfectly or somewhat poorly drained, poorly drained,* and *very poorly drained.*

Nutrients, plant. The elements taken in by the plant, essential to its growth, and used by it in the elaboration of its food and tissue. These include nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, molybdenum, copper, boron, zinc, and perhaps others obtained from the soil; and carbon, hydrogen, and oxygen, obtained largely from the air and water.

Parent material. The unconsolidated mass from which the soil profile develops.

Permeability, soil. That quality of the soil that enables it to transmit water or air.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Productivity, soil. Capacity of a soil for producing a specified plant or sequence of plants under a defined set of management practices.

Relief. The elevations or inequalities of a land surface considered collectively.

Sand. Small rock or mineral fragments with diameters ranging between 0.05 mm. (0.002 in.) and 2.0 mm. (0.079 in.). The term sand is also applied to soils containing 90 percent or more of sand.

Silt. Small mineral soil grains ranging from 0.002 mm. (0.000079 in.) to 0.05 mm. (0.002 in.) in diameter.

Slope classes, as used in this report, are:

	Percent		*Percent*
Level	0– 2	Hilly	12–25
Undulating	2– 5	Steep	25 or more
Rolling	5–12		

Soil. The natural medium for the growth of land plants on the surface of the earth, composed of organic and mineral materials.

Soil, textural classes. Classes of soil texture are based on the relative proportion of soil separates. The basic classes in order of increasing proportions of the fine separates are: Sand, loamy sand, sandy loam, loam, silt loam, silt,

sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay.

Soil separates. The individual size-groups of mineral particles.

Stripcropping. Stripcropping is a practice of growing ordinary farm crops in long strips of variable widths across the line of slope or approximately on the contour. Close-growing crops are seeded in alternate strips with clean-tilled crops.

Structure, soil. The arrangement of the individual grains and aggregates that make up the soil mass; may refer to the natural arrangement of the soil when in place and undisturbed or to the soil at any degree of disturbance. Soil structure is classified according to grade, class, and type.

Grade. Degree of aggregation, or the differential between cohesion within aggregates and adhesion between aggregates. Terms: *Structureless* (*single grain* or *massive*), *weak*, *moderate*, and *strong*.

Class. Size of soil aggregates. Terms: *Very fine* or *very thin*, *fine* or *thin*, *medium*, *coarse* or *thick*, and *very coarse* or *very thick*.

Type. Shapes for soil aggregates. Terms: *Platy*, *prismatic*, *columnar*, *blocky*, *nuciform* or *nutlike*, *granular* (nonporous), and *crumb* (porous). Example of soil-structure grade, class, and type: Moderate coarse blocky.

Principal structure types in this county are the blocky and crumb. Peds (aggregates) of fine blocky structure are 5 to 10 mm. (0.2 to 0.4 inch) in size; medium blocky, 10 to 20 mm. (0.4 to 0.8 inch); and coarse blocky, 20 to 50 mm. (0.8 to 2.0 inches). Peds of fine crumb structure are 1 to 2 mm. (0.04 to 0.08 inch) in size, and peds of medium crumb structure are 2 to 5 mm. (0.08 to 0.2 inch) in size.

Subsoil. Technically, the B horizon; roughly, that part of the profile below plow depth.

Surface runoff. The amount of water removed by flow over the surface of the soil. The amount and rapidity of surface runoff are affected by factors such as texture, structure, and porosity of the surface soil; the vegetative covering; the prevailing climate; and the slope. Degrees of surface runoff are expressed as follows: *Very rapid*, *rapid*, *medium*, *slow*, *very slow*, and *ponded*.

Surface soil. Technically, the A horizon; commonly, that part of the upper profile usually stirred by plowing.

Terrace (for control of surface runoff, erosion, or both). A broad surface channel or embankment constructed across the slopes on the contour or at a slight angle to the contour. The terrace intercepts surplus surface runoff to retard it for infiltration into the soil so that any excess may flow slowly to a prepared outlet without harm.

Texture, soil. Size of individual particles making up the soil mass. The various soil separates, as sand, silt, and clay, determine texture. A coarse-textured soil is one high in content of sand; a fine-textured soil has a large proportion of clay.

Workability, soil. Refers to the ease with which tillage, harvesting, and other farming operations can be accomplished.

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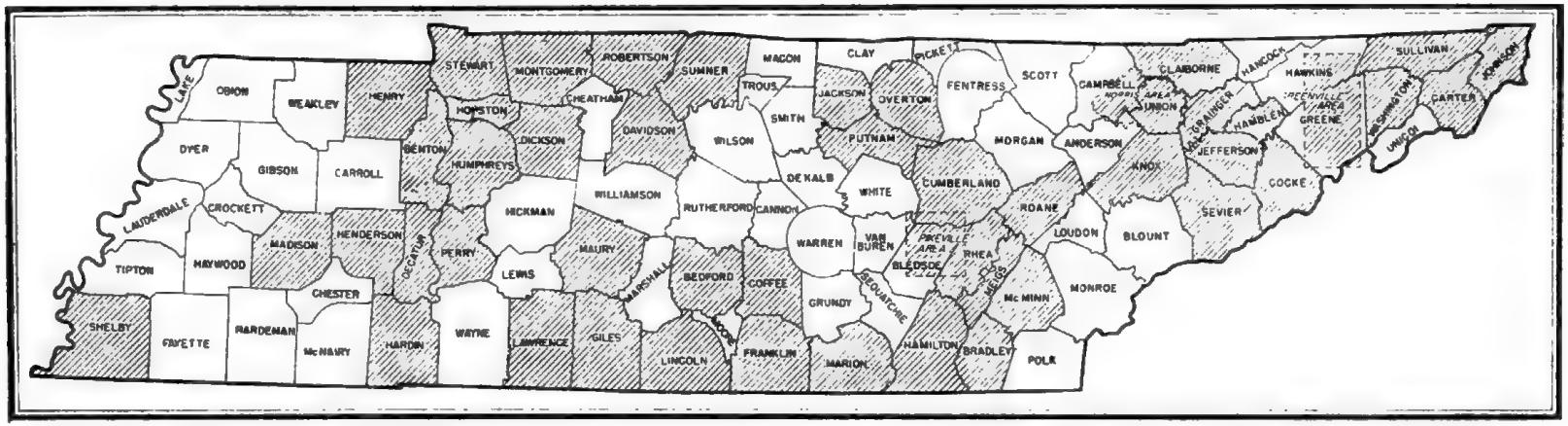

Areas surveyed in Tennessee shown by shading.

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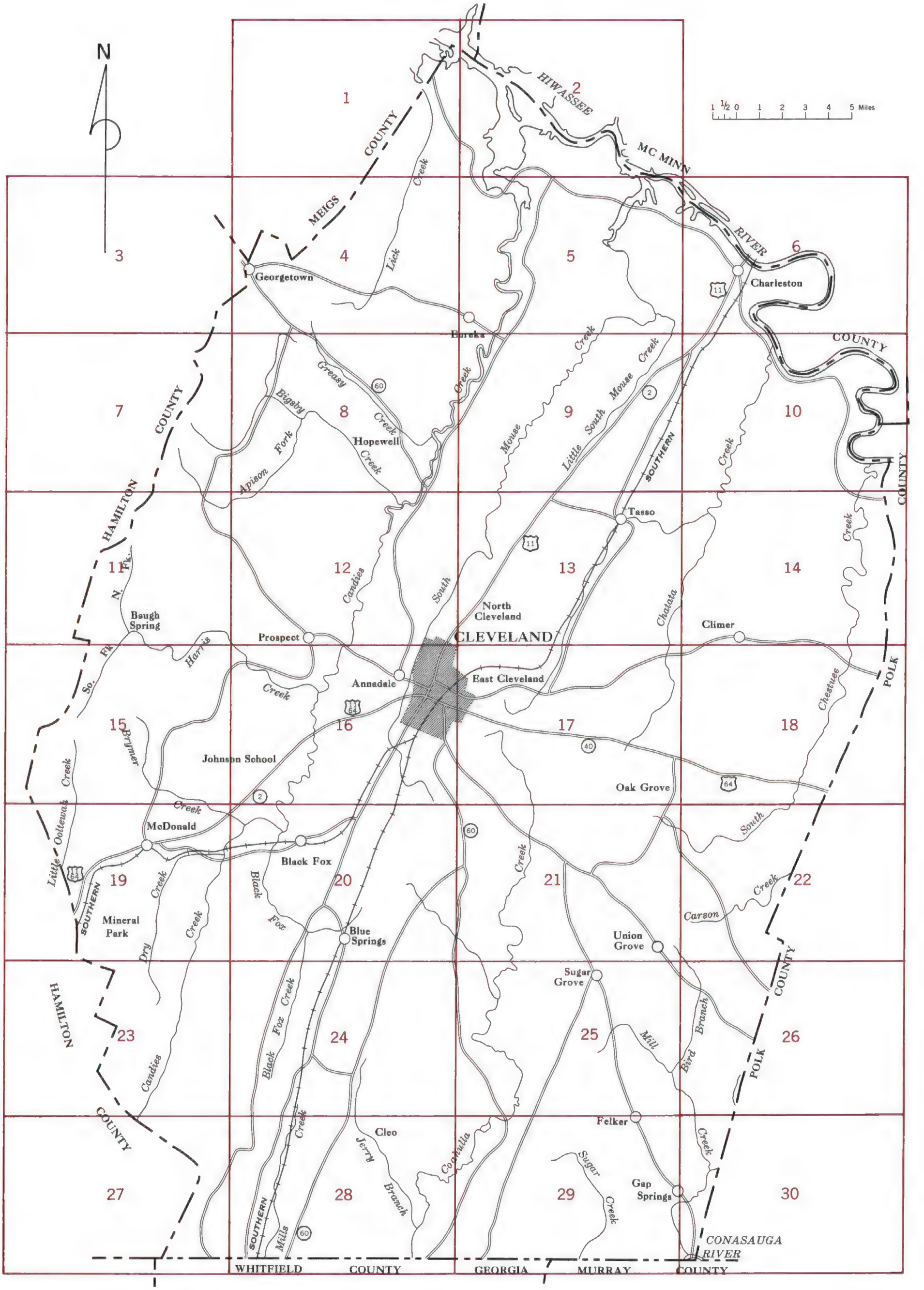

SOILS LEGEND

SYMBOL	NAME
Aa	Alcoa loam, eroded rolling phase
Ab	Apison silt loam, eroded rolling phase
Ac	Apison silt loam, eroded undulating phase
Ad	Apison silt loam, rolling phase
Ae	Apison silt loam, severely eroded rolling phase
Af	Apison silt loam, undulating phase
Ba	Barbourville loam
Bb	Barbourville stony loam
Bc	Bolton silt loam, eroded hilly phase
Bd	Bolton silt loam, eroded rolling phase
Be	Bolton silt loam, eroded steep phase
Bf	Bruno loamy fine sand
Ca	Capshaw silt loam, undulating phase
Cb	Clarksville cherty silt loam, eroded hilly phase
Cc	Clarksville cherty silt loam, eroded rolling phase
Cd	Clarksville cherty silt loam, hilly phase
Ce	Clarksville cherty silt loam, rolling phase
Cf	Clarksville cherty silt loam, steep phase
Cg	Colbert silty clay, eroded rolling phase
Ch	Colbert silty clay, eroded undulating phase
Ck	Conasauga silt loam, eroded undulating phase
Cl	Conasauga silt loam, level phase
Cm	Conasauga silt loam, undulating phase
Cn	Cotaco loam
Co	Cotaco silt loam
Cp	Cumberland silty clay loam, eroded rolling phase
Cr	Cumberland silty clay loam, eroded undulating phase
Cs	Cumberland silty clay loam, severely eroded hilly phase
Ct	Cumberland silty clay loam, severely eroded rolling phase
Da	Dandridge shaly silt loam, eroded hilly phase
Db	Dandridge shaly silt loam, eroded rolling phase
Dc	Dandridge shaly silt loam, eroded steep phase
Dd	Dandridge shaly silt loam, hilly phase
De	Dandridge shaly silt loam, steep phase
Df	Decatur silty clay loam, eroded rolling phase
Dg	Decatur silty clay loam, eroded undulating phase
Dh	Dewey silty clay loam, eroded rolling phase
Dk	Dewey silty clay loam, eroded undulating phase
Dl	Dewey silty clay, severely eroded rolling phase
Dm	Dowellton silty clay loam
Ea	Emory silt loam
Eb	Etowah silt loam, eroded rolling phase
Ec	Etowah silt loam, eroded undulating phase
Ed	Etowah silt loam, undulating phase
Fa	Farragut silty clay, severely eroded rolling phase
Fb	Farragut silty clay loam, eroded rolling phase
Fc	Farragut silty clay loam, eroded undulating phase
Fd	Fullerton cherty silt loam, eroded hilly phase
Fe	Fullerton cherty silt loam, eroded rolling phase
Ff	Fullerton cherty silt loam, eroded steep phase
Fg	Fullerton cherty silt loam, hilly phase
Fh	Fullerton cherty silt loam, rolling phase
Fk	Fullerton cherty silt loam, steep phase
Fl	Fullerton cherty silty clay loam, severely eroded hilly phase
Fm	Fullerton cherty silty clay loam, severely eroded rolling phase
Fn	Fullerton cherty silty clay loam, severely eroded steep phase
Fo	Fullerton loam, eroded hilly phase
Fp	Fullerton loam, eroded rolling phase
Fr	Fullerton silt loam, eroded hilly phase
Fs	Fullerton silt loam, eroded rolling phase
Ft	Fullerton silt loam, eroded undulating phase
Fu	Fullerton silt loam, rolling phase
Fv	Fullerton silty clay loam, severely eroded hilly phase
Fw	Fullerton silty clay loam, severely eroded rolling phase

SYMBOL	NAME
Ga	Greendale chert silt loam
Gb	Greendale silt loam
Gc	Gullied land, calcareous sandstone soil materials
Gd	Gullied land, limestone soil materials
Ge	Gullied land, shale soil materials
Ha	Hamblen silt loam
Hb	Hermitage silt loam, eroded rolling phase
Hc	Hermitage silt loam, eroded undulating phase
Hd	Hermitage silt loam, undulating phase
He	Holston loam, eroded rolling phase
Hf	Holston loam, eroded undulating phase
Hg	Huntington loam
Hh	Huntington silt loam
Ja	Jefferson loam, eroded rolling phase
Jb	Jefferson loam, eroded undulating phase
Jc	Jefferson loam, rolling phase
La	Leadvale silt loam, eroded rolling phase
Lb	Leadvale silt loam, eroded undulating phase
Lc	Leadvale silt loam, undulating phase
Ld	Lehew-Montevallo loams, eroded hilly phases
Le	Lehew-Montevallo loams, eroded rolling phases
Lf	Lehew-Montevallo loams, eroded steep phases
Lg	Lehew-Montevallo loams, hilly phases
Lh	Lehew-Montevallo loams, rolling phases
Lk	Lehew-Montevallo loams, steep phases
Ll	Lindside silt loam
Lm	Litz shaly silt loam, eroded hilly phase
Ln	Litz shaly silt loam, eroded rolling phase
Lo	Litz shaly silt loam, eroded undulating phase
Lp	Litz shaly silt loam, hilly phase
Lr	Litz shaly silt loam, rolling phase
Ma	Melvin silt loam
Mb	Minvale cherty silt loam, eroded rolling phase
Mc	Minvale cherty silt loam, rolling phase
Md	Minvale silt loam, eroded rolling phase
Me	Minvale silt loam, eroded undulating phase
Mf	Minvale silt loam, rolling phase
Mg	Minvale silt loam, undulating phase
Mh	Monongahela silt loam, undulating phase
Mk	Montevallo and Muskingum soils, hilly phases
Ml	Montevallo and Muskingum soils, rolling phases
Mm	Montevallo and Muskingum soils, steep phases
Mn	Montevallo shaly silt loam, eroded hilly phase
Mo	Montevallo shaly silt loam, eroded rolling phase
Mp	Montevallo shaly silt loam, eroded undulating phase
Mr	Montevallo shaly silt loam, hilly phase
Ms	Montevallo shaly silt loam, rolling phase
Mt	Mullins silt loam
Mu	Muse silt loam, eroded hilly phase
Mv	Muse silt loam, eroded rolling phase
Mw	Muse silt loam, eroded undulating phase
Mx	Muse silt loam, rolling phase
My	Muse silt loam, undulating phase

SYMBOL	NAME
Na	Neubert loam
Pa	Pace cherty silt loam, eroded rolling phase
Pb	Pace cherty silt loam, rolling phase
Pc	Pace silt loam, eroded rolling phase
Pd	Pace silt loam, eroded undulating phase
Pe	Pace silt loam, undulating phase
Pf	Prader silt loam
Pg	Purdy silt loam
Ra	Rockland, limestone
Sa	Sequatchie loam, undulating phase
Sb	Sequoia silt loam, rolling phase
Sc	Sequoia silt loam, undulating phase
Sd	Sequoia silty clay, severely eroded rolling phase
Se	Sequoia silty clay loam, eroded rolling phase
Sf	Sequoia silty clay loam, eroded undulating phase
Sg	Staser loam
Sh	Staser silt loam
Sk	Stony rolling and hilly land, limestone
Ta	Talbott silty clay loam, eroded rolling phase
Tb	Talbott silty clay loam, eroded undulating phase
Tc	Talbott silty clay, severely eroded rolling phase
Td	Tellico clay loam, severely eroded hilly phase
Te	Tellico clay loam, severely eroded steep phase
Tf	Tellico fine sandy loam, eroded hilly phase
Tg	Tellico fine sandy loam, eroded rolling phase
Th	Tellico fine sandy loam, eroded steep phase
Tk	Tellico fine sandy loam, steep phase
Tl	Tellico silt loam, eroded rolling phase
Tm	Tellico silty clay loam, severely eroded hilly phase
Tn	Tyler silt loam
Wa	Waynesboro cobbly loam, eroded hilly phase
Wb	Waynesboro cobbly loam, eroded rolling phase
Wc	Waynesboro loam, eroded rolling phase
Wd	Whitwell loam
We	Wolftever silt loam, undulating phase

Soils surveyed 1948-50 by Charles J. Fox and Samuel R. Bacon, U. S. Department of Agriculture, and Robbie L. Flowers and Theodore R. Love, Tennessee Agricultural Experiment Station.
Correlation by Lester E. Odom, U. S. Department of Agriculture.

Soil map constructed by Cartographic Division, Soil Conservation Service, USDA, from 1950 aerial photographs. Controlled mosaic based on polyconic projection, 1927 North American datum.

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1950 .

(Sheet 4)

(Sheet 2)

BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N

(2)

N

BRADLEY COUNTY, TENNESSEE (Sheet 1)

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 5)

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(Sheet 7)

(Sheet 4)

BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N

(3)

(4)

(Sheet 1)

N

Gum Springs Church

Etoia

East View School

Creek

D I S T R I C T 2

(Sheet 5)

MEIGS COUNTY

HAMILTON CO

Georgetown

Mt Zion Church

(Sheet 8)

(Sheet 3)

BRADLEY COUNTY, TENNESSEE

Scale 1:20000

0 ½ 1 Mile

0 5000 Feet

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BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N

5

BRADLEY COUNTY, TENNESSEE

N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

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BRADLEY COUNTY, TENNESSEE

N

0 1 Mile

Scale 1:20000

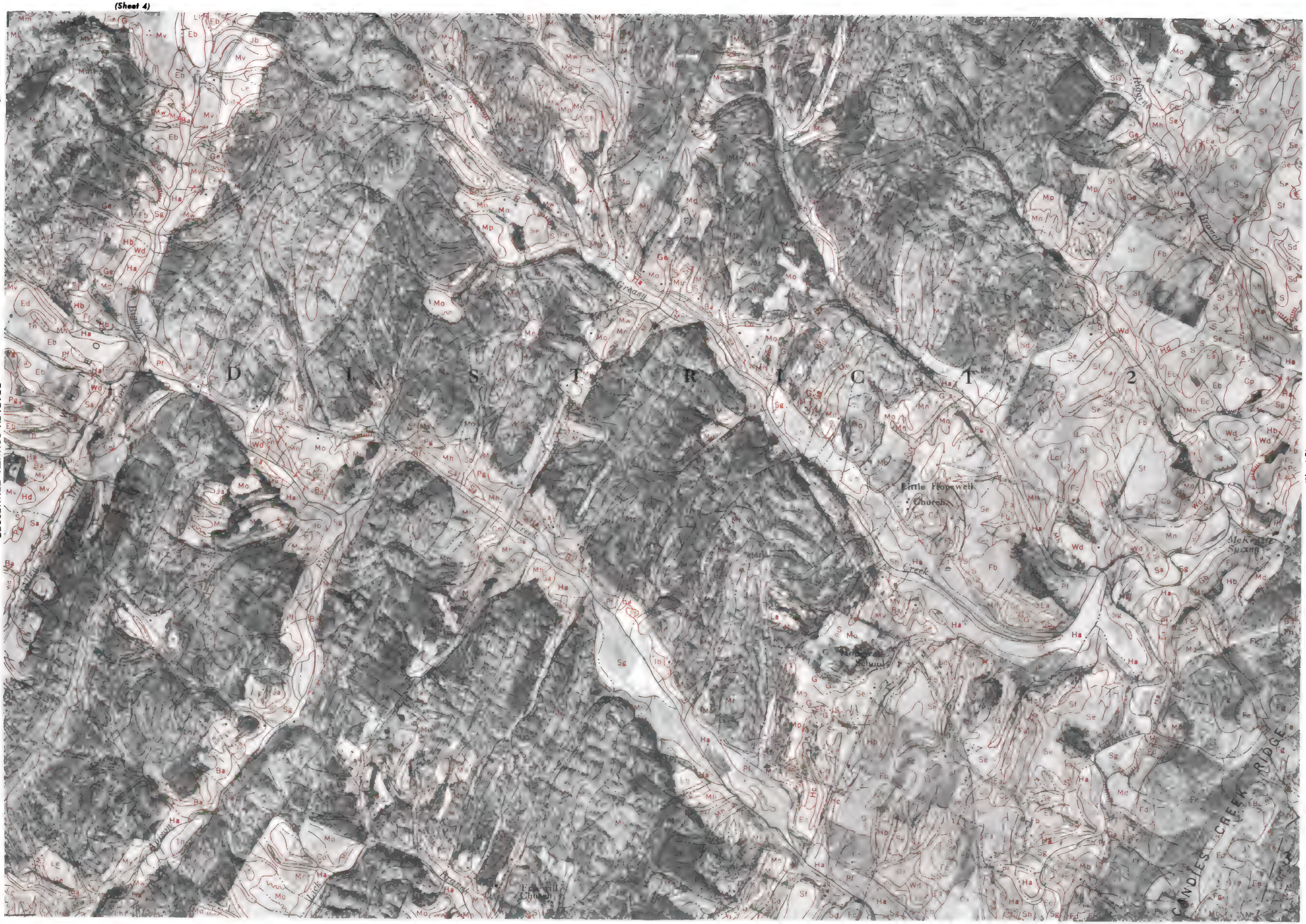
0 5000 Feet

7

8

(Sheet 4)

N



(Sheet 9)

(Sheet 7)

(Sheet 12)

BRADLEY COUNTY, TENNESSEE

Scale 1:20 000

0 ½ 1 Mile

0 5000 Feet

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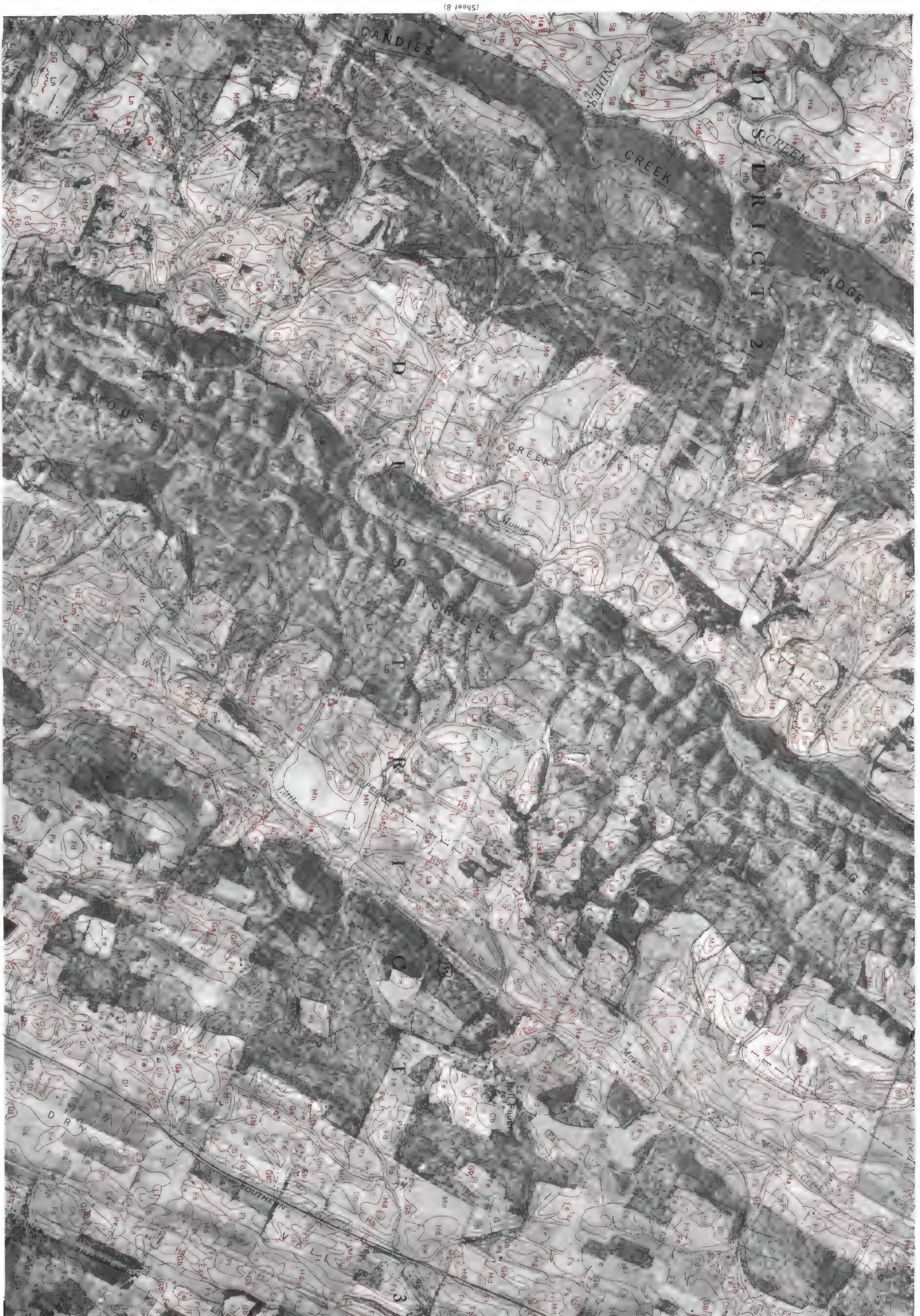

BRADLEY COUNTY, TENNESSEE

N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BRADLEY COUNTY, TENNESSEE

N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

10

(Sheet 7)

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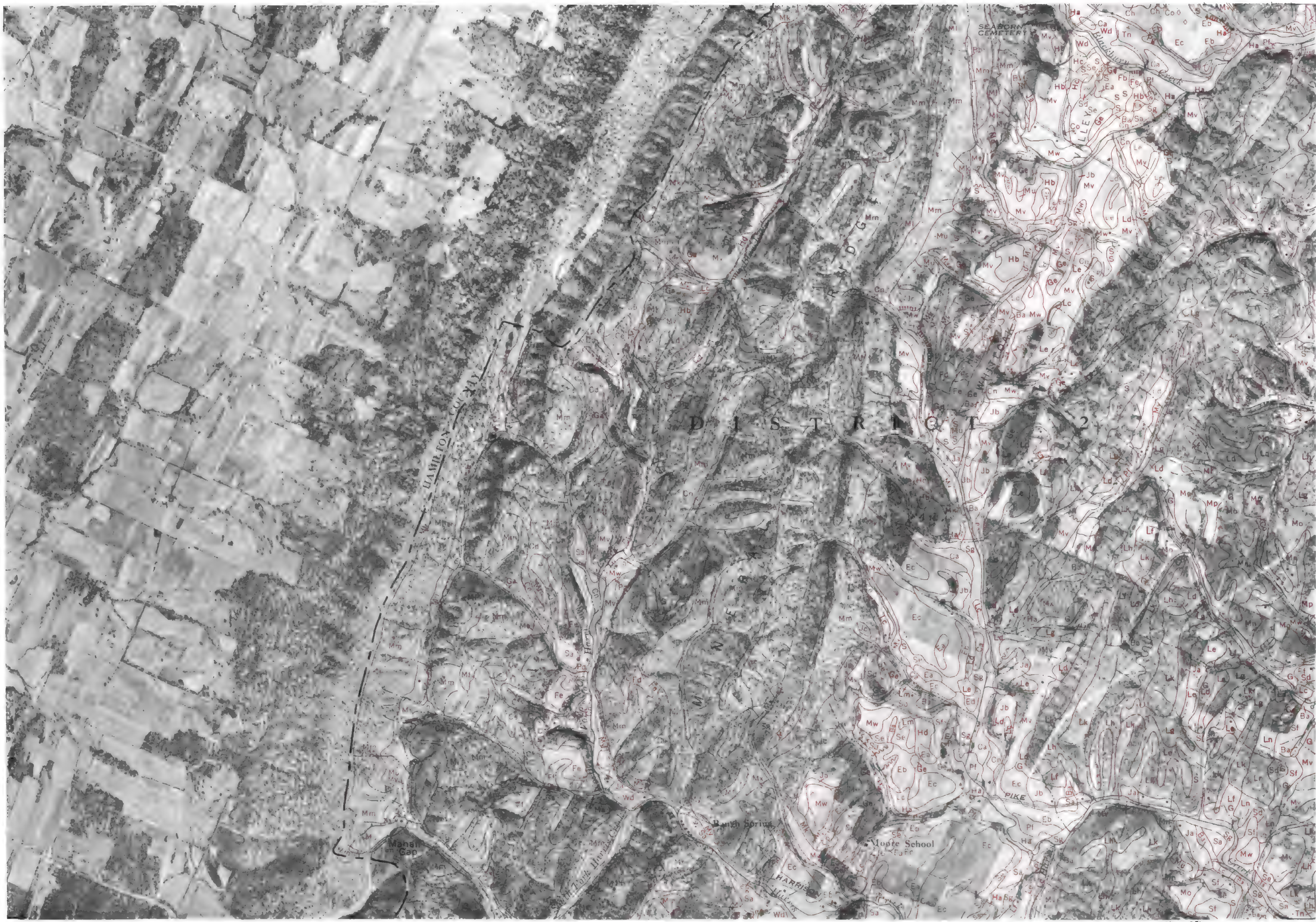


N

BRADLEY COUNTY, TENNESSEE

Scale 1:20000

5000 Feet 0

1 Mile 1/2 0

(Sheet 12)

(Sheet 15)

12

(Sheet 8)

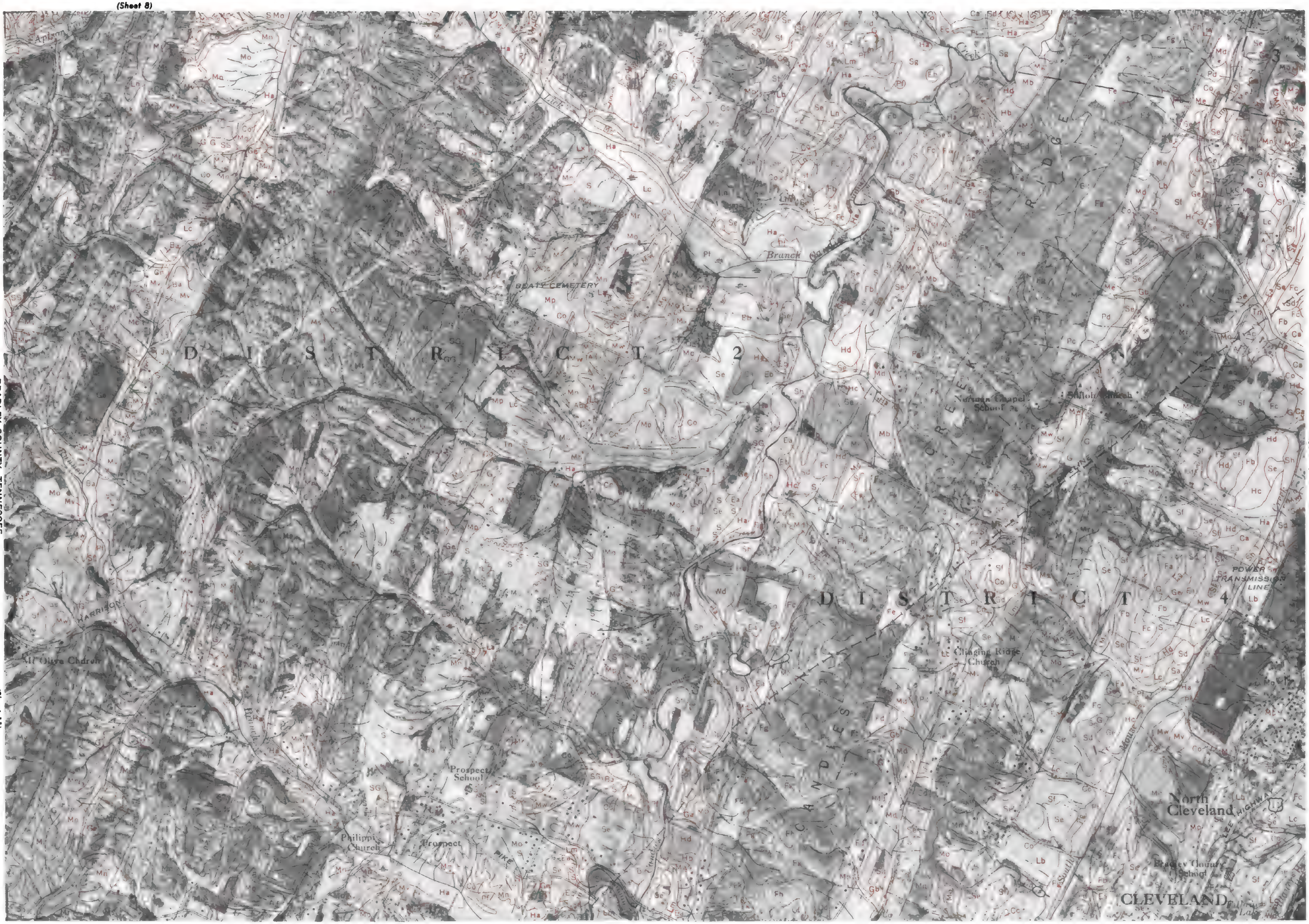
N

BRADLEY COUNTY, TENNESSEE

Scale 1:20000

0 ½ 1 Mile

0 5000 Feet



(Sheet 13)

(Sheet 11)

(Sheet 16)

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(Sheet 12)

(Sheet 14)

BRADLEY COUNTY, TENNESSEE

N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 17)

(Sheet 9)

N

BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

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(Sheet 16)

BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N

(Sheet 19)

(Sheet 11)

15

(16)

(Sheet 12)

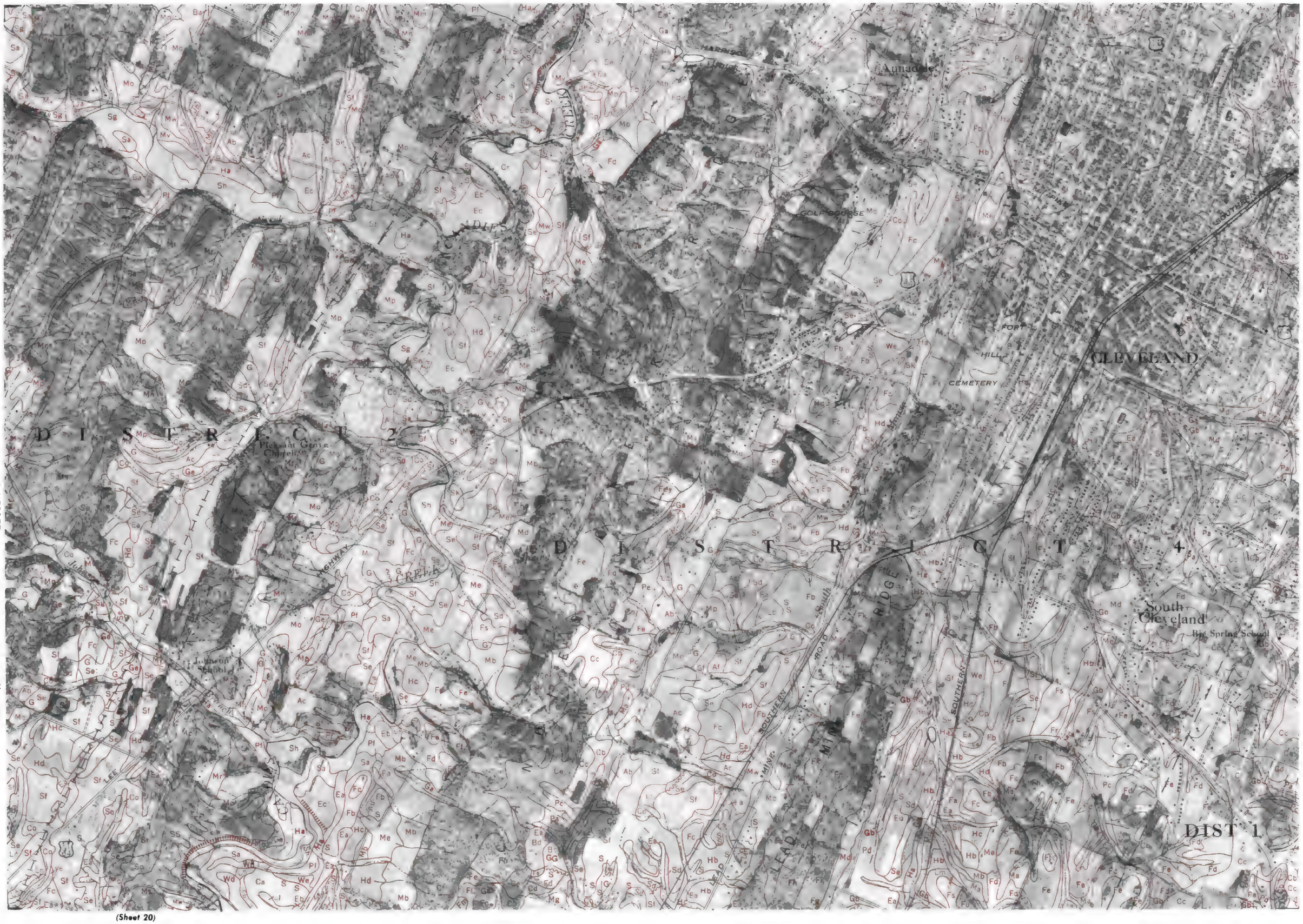
N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BRADLEY COUNTY, TENNESSEE



(Sheet 15)

(Sheet 17)

(Sheet 20)

(Sheet 13)

17

DISTRICT 4

DISTRICT 1

SOUTHERN

Michigan Avenue School

PERKLE CEMETERY

Michigan Avenue Church

East Cleveland

Oak Grove Church

CLEVELAND

Oak Grove School

Chestnee Church

Mile

PARKSVILLE

ROAD

Branch

Creek

Coahulla

N

5,000 Feet

0

BRADLEY COUNTY, TENNESSEE

1 Mile

Scale 1:20 000

½

0

(Sheet 18)

(Sheet 19)

(Sheet 21)

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1950


(Sheet 14)
(Sheet 22)
(Sheet 17)
Z
0
½
1 Mile
Scale 1:20000
0
5000 Feet
BRADLEY COUNTY, TENNESSEE
18

This is one of a set of maps prepared by the Soil Conservation Service, U. S. Department of Agriculture, for a soil survey report of this area. For information regarding the complete soil survey report, write the Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C. This map compiled from aerial photographs flown in 1950.

N

DISTRICT 2

McDonald

Tucker Springs

Mineral Park

LAUDERBACK RIDGE

SMITH RIDGE

BUTLER KNOBS

PINE HILL RIDGE

Owl Hollow

Little Owl Hollow

Tin Creek

Dulltop Branch

Wolftever Creek

Little Wolftever Creek

Candies Creek

Dry Creek

SOUTHERN RAILWAY

HIGHWAY

HAMILTON COUNTY

HAMILTON COUNTY ROAD

BRADLEY COUNTY, TENNESSEE

Scale 1:20000

5000 Feet 0

1 Mile 0

(Sheet 20)

(Sheet 23)

N

BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

20

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BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20 000

0 5 000 Feet

N

(Sheet 18)

(Sheet 26)

(Sheet 21)

N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

BRADLEY COUNTY, TENNESSEE

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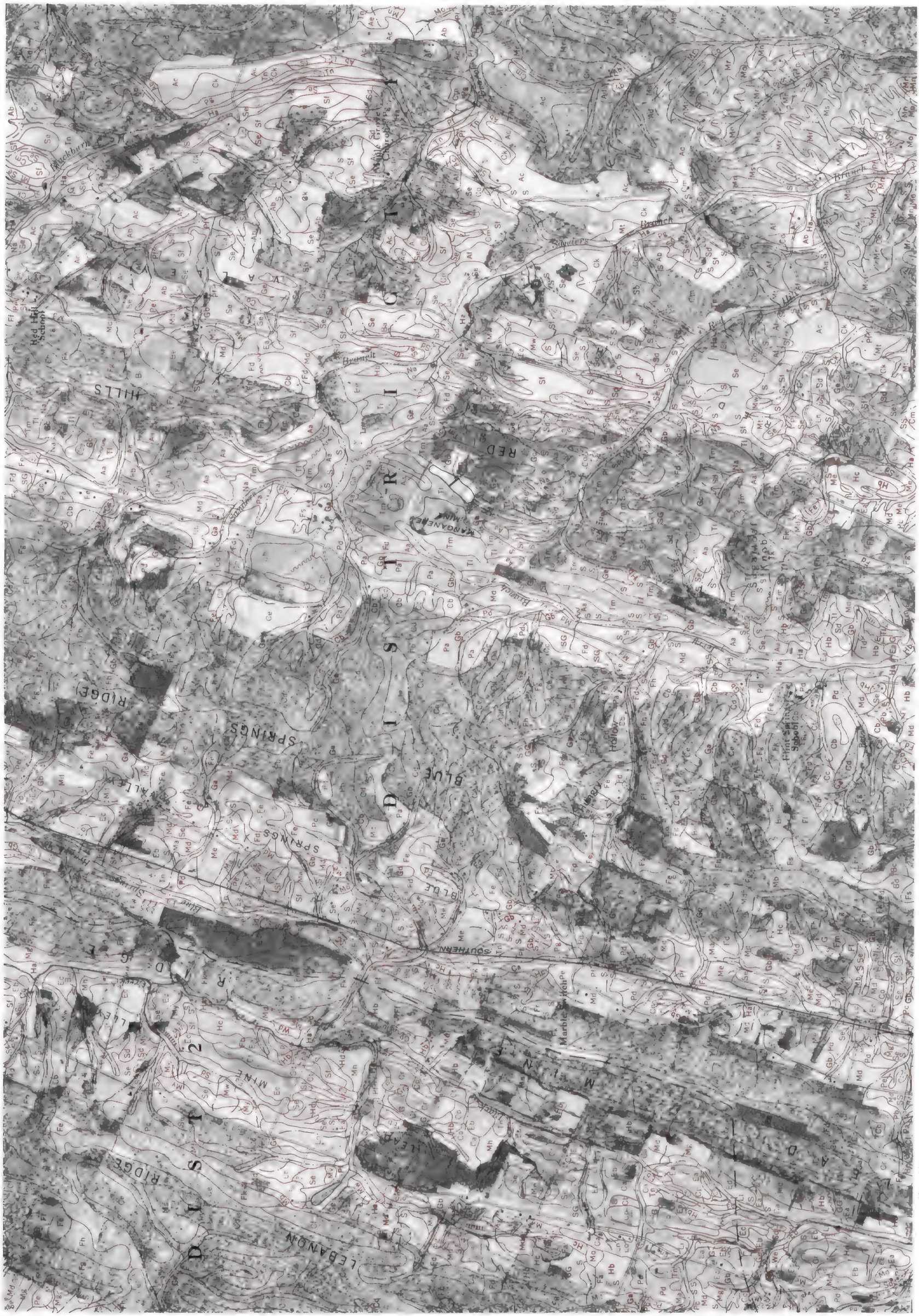
BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N



BRADLEY COUNTY, TENNESSEE

N

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

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(Sheet 24)

(Sheet 29)

(Sheet 21)

(Sheet 26)

BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N

25

(Sheet 22)

(Sheet 25)

(Sheet 30)

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BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

N

(Sheet 24)

N

LEAD MINE RIDGE

Mt Carmel Church

Mt Carmel School

Wembley Switch

Johnson Knob

Straw Hill Church

SOUTHERN

DISTRICT 1

WHITFIELD COUNTY

GEORGIA

BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

0 5000 Feet

(Sheet 27)

(Sheet 29)

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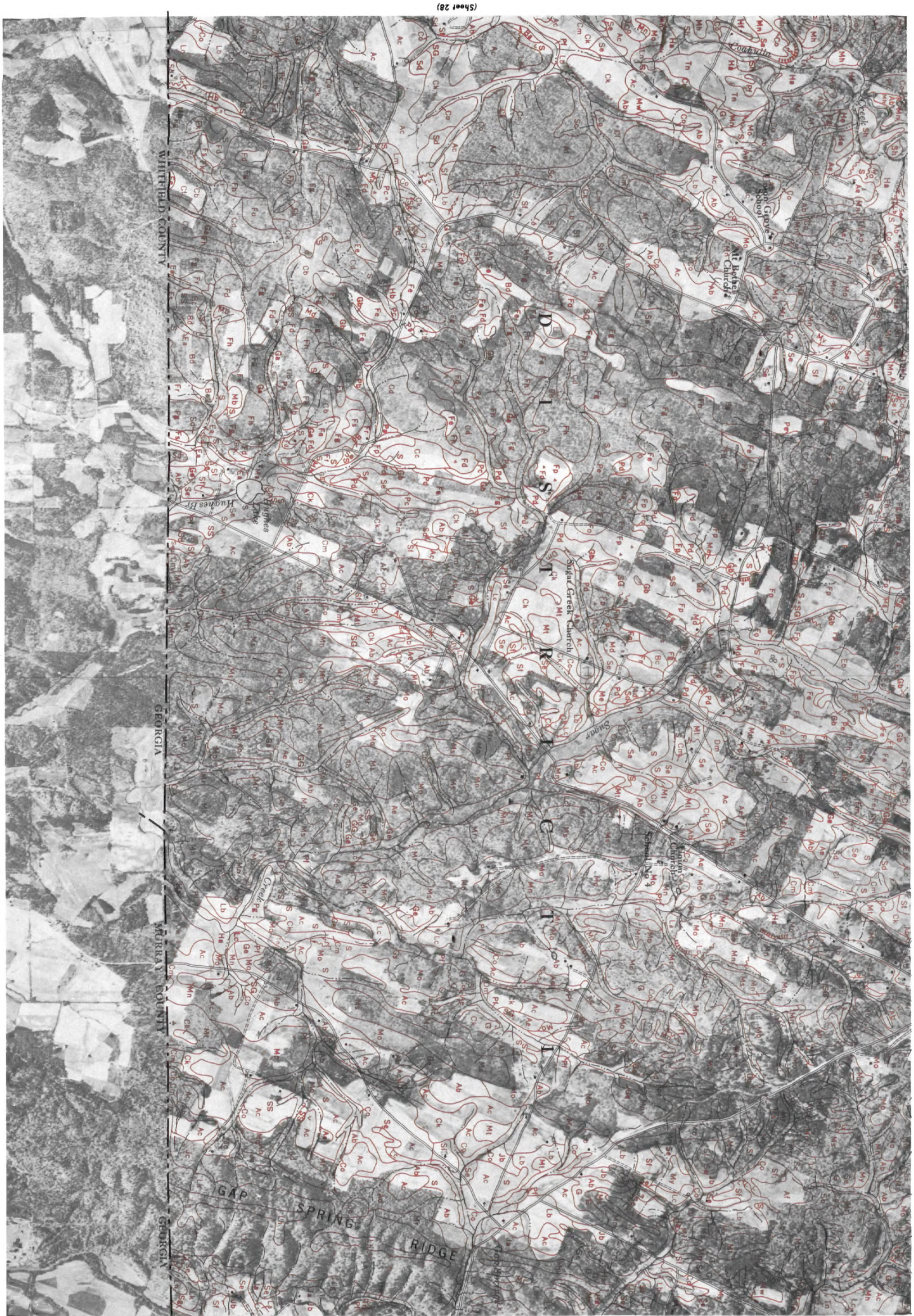
(Sheet 28)



(Sheet 30)

(Sheet 25)

BRADLEY COUNTY, TENNESSEE

0 ½ 1 Mile

Scale 1:20000

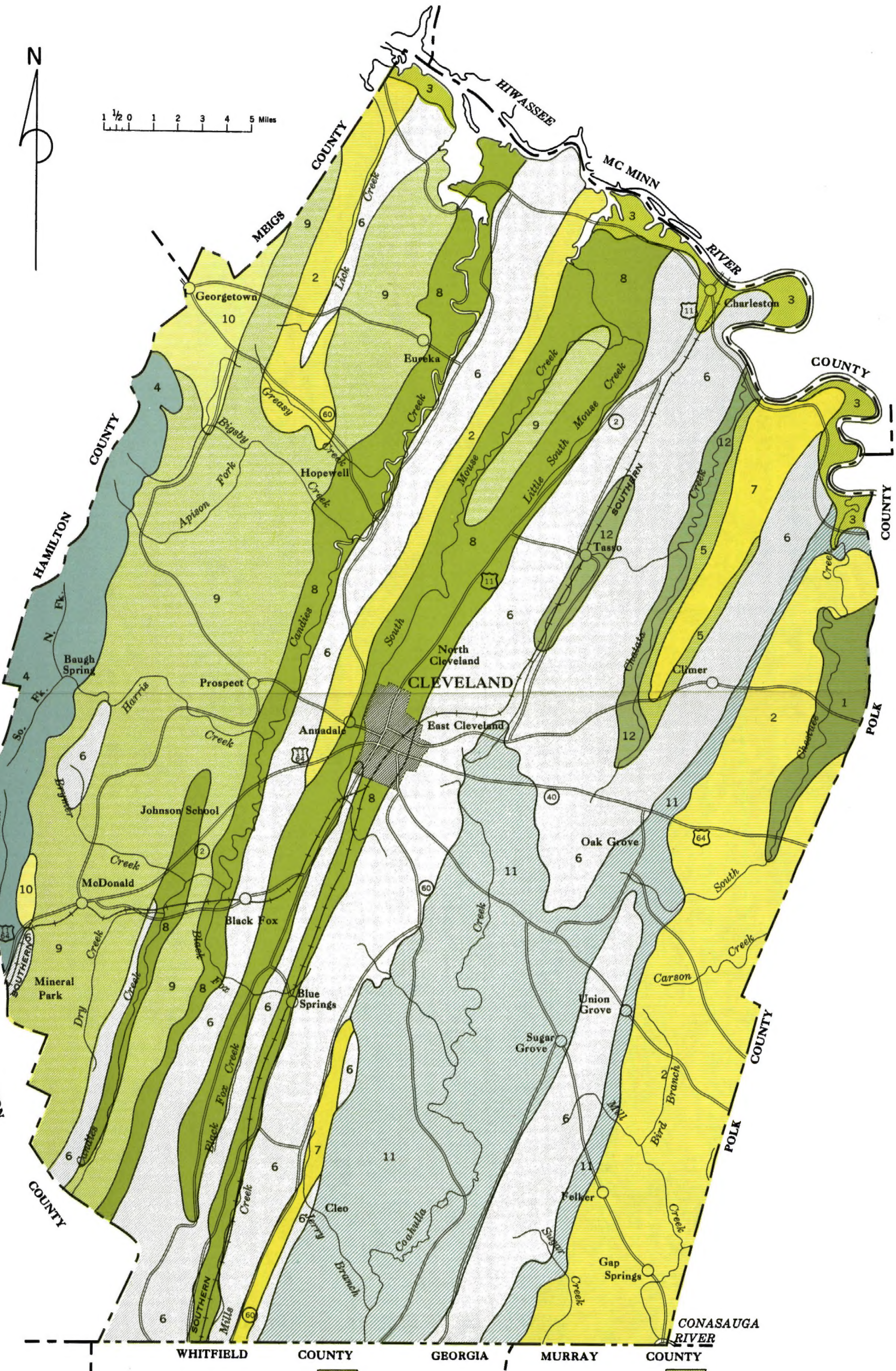
0 5000 Feet

N


(Sheet 26)
N
DIST 1
POLK COUNTY
TENNESSEE
GEORGIA
MURRAY
COUNTY
GEORGIA
CONASAUGA
RIVER
BRADLEY COUNTY, TENNESSEE
Scale 1:20000
0
½
1 Mile
0
5000 Feet
(Sheet 29)

SOIL ASSOCIATIONS MAP

BRADLEY COUNTY, TENNESSEE



1	LITZ-SEQUOIA-COTACO	5	SEQUOIA-TALBOTT-COLBERT
2	MONTEVALLO-APISON-COTACO	6	FULLERTON-CLARKSVILLE-GREENDALE
3	CUMBERLAND-ETOWAH-SEQUATCHIE	7	TELLICO-ALCOA-NEUBERT
4	MONTEVALLO-MUSKINGUM-JEFFERSON-BARBOURVILLE	8	SEQUOIA-FARRAGUT-HERMITAGE
9	LEHEW-MONTEVALLO-COTACO		
10	TALBOTT-COLBERT-STONY LAND		
11	APISON-SEQUOIA-LEADVALE		
12	DEWEY-FULLERTON-EMORY		

BRADLEY COUNTY, TENNESSEE
CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Roads

- Good motor
- Poor motor
- Trail
- Marker, U. S. (33)

Railroads

- Single track
- Multiple track
- Abandoned

Bridges and crossings

- Road
- Trail foot
- Railroad
- Ferry
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings

- School
- Church
- Station

Mine and Quarry

- Shaft
- Dump
- Prospect

Pits, gravel or other

Power line

Pipeline

Cemetery

Dam

Levee

Tank

Forest fire tower

Windmill

Canal lock (point upstream)

BOUNDARIES

- National or state
- County
- Township, civil (indefinite)
- U. S.
- Section
- City (corporate)
- Reservation
- Land grant

DRAINAGE

Streams

- Perennial
- Intermittent, unclass.
- Crossable with tillage implements
- Not crossable with tillage implements

Canals and ditches (CANAL, DITCH)

Lakes and ponds

- Perennial
- Intermittent

Wells (flowing)

Springs

Marsh

Wet spot

RELIEF

Escarpments

- Bedrock
- Other

Prominent peaks

Depressions (Large, Small)

- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

- Soil type outline and symbol (Dx)
- Gravel
- Stones
- Spot too stony to cultivate (xx)
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land

Erosion

- Spot less eroded than normal for this area (K)
- Uneroded spot (U)
- Sheet, moderate (S)
- Sheet, severe (SS)
- Gully, moderate (G)
- Gully, severe (GG)
- Sheet and gully, moderate (SG)
- Wind, moderate
- Wind, severe
- Blowout
- Wind hummock
- Overblown soil

Gullies

Areas of alkali and salts (A, M, S)

- Strong
- Moderate
- Slight

Free of toxic effect (F)

Sample location (26)

Saline spot